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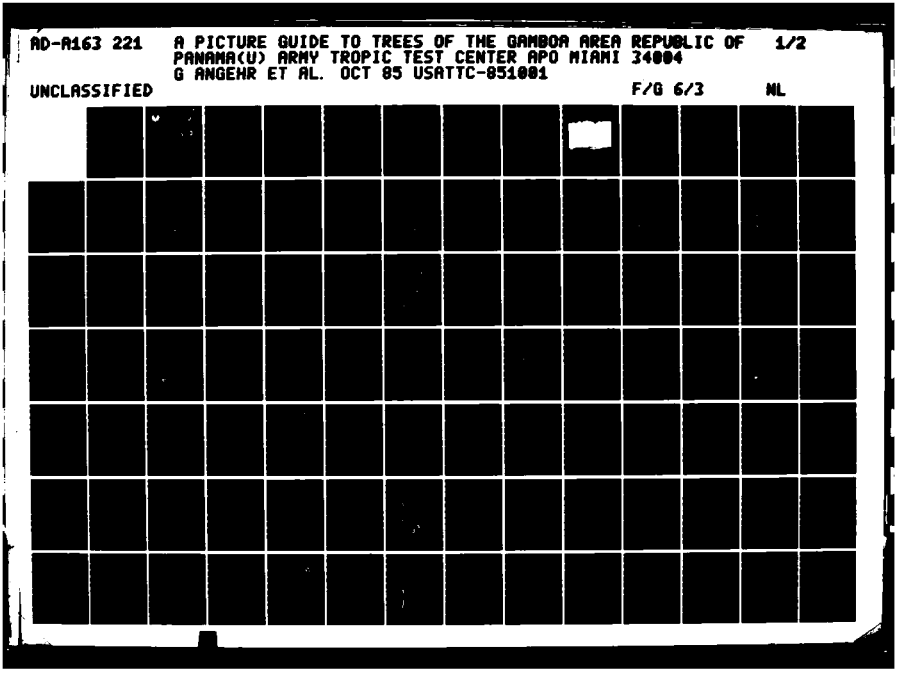

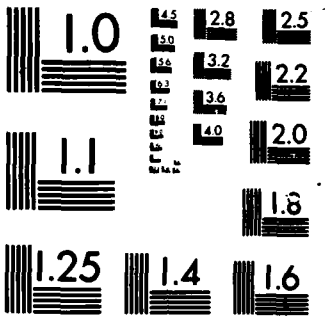

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US ARMY
TEST AND EVALUATION COMMAND

US ARMY
MATERIEL COMMAND

A PICTURE GUIDE TO TREES OF THE GAMBOA AREA REPUBLIC OF PANAMA

by

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Phyllis Coley

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MATERIEL TEST DIVISION

UNITED STATES ARMY TROPIC TEST CENTER

APO MIAMI 34004

October 1985

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This report presents a picture guide to trees of the Gamboa Area, Republic of Panama. This guide will be used to aid personnel in planning and conducting tropic environmental tests of materiel under development for the Department of Defense, and in preparing general vegetation descriptions of test sites. → (to p1)

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FOREWORD

This picture guide to the vegetation of the lowland tropical forest around Gamboa, Republic of Panama, is an addendum to a methodology investigation,[1] completed by the US Army Tropic Test Center (USATTC) in 1979. This guide was prepared by the Smithsonian Tropical Research Institute to aid USATTC in planning and conducting tropic environmental tests, and in preparing general vegetation descriptions of test sites without the help of a specialist in tropic plant taxonomy. It can be used in the field by personnel with little or no botanical training. Although the selection of plants included was based on surveys of the Gamboa area, the guide will be useful for environmental characterizations of all test areas available to USATTC.

The Smithsonian Tropical Research Institute was under contract by USATTC to prepare this guide. The authors were George Angehr, Phyllis Coley, and Andrea Worthington. Judy Gradwohl provided the ink drawings in the guide, and Arlee Montalvo gave advice on the illustration techniques used. Linda M. Zornes, USATTC Technical Publications Writer/Editor, edited the document and refined it into a cohesive format.

Extensive collections of pressed plants have been made by T.B. Croat, R.B. Foster, D.H. Knight, and others. The recent Flora of Barro Colorado Island by T.B. Croat[2] and the Flora of Panama (Missouri Botanical Gardens)[3] provided much useful information.

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[1] Rula, A.A. Methodology Investigation Final Report, Characterization of Test Environment, US Army Tropic Test Center, Republic of Panama, 1979.

[2] Croat, T.B. Flora of Barro Colorado Island, Stanford University Press, Stanford, California, 1978.

[3] Woodson, R.E., Jr., and R.W. Schery (ed). Flora of Panama, Annals of the Missouri Botanical Gardens, Volumes 30-66, 1943-1979.

SECTION I. INTRODUCTION

A. GENERAL DESCRIPTION OF THE GAMBOA AREA VEGETATION

The mature forest vegetation around Gamboa is semi-evergreen moist tropical forest. Other vegetation types in the area include grasslands, swamps, second-growth forest, and some recently cut or continually disturbed areas. Figure 1 illustrates the variety of vegetation types in the area. In terms of the Holdridge Life-Zone System,* the area is classified in the Tropical Moist Forest Life Zone.

Rainfall ranges from 190 to 360 centimeters per year. The climate is markedly seasonal with a distinct dry season (verano) beginning mid-December and ending in April or May. The remaining months comprise the tropic wet season. Rainfall during the dry season can be only 18 to 26 centimeters. The life of many plants in the area is regulated by the end or beginning of the wet season.

Many plants described in this guide lose their leaves for much of the dry season. Some unique plants shed their leaves during the wet season.

Normally, there is a burst of flowering in the dry season, which peaks at the onset of the rains in April or May. Many trees use the rains as seasonal cues to begin flowering.

Fruiting occurs in the forest at two distinct peaks: during the late dry season (April to May), and during the middle of wet season (July to September); although, fruit of some kind can be found year-round. Generally, trees that fruit in the dry season are wind-dispersed, taking advantage of the strong trade winds; those that fruit in the wet season normally are animal-dispersed.

B. ORGANIZATION OF THE GUIDE

The guide was designed for use in the field by people who have no botanical training. It relies on tree characteristics which are seen easily from the ground without binoculars. Tree and leaf shape are emphasized in the drawings. Written descriptions are provided to assist identification.

This picture guide includes fifty of the most common trees in the lowland tropic forest around Gamboa, seven conspicuous grasses, and four large understory herbs. Although there are approximately 400 species of trees and shrubs in the Gamboa area, many are encountered only rarely. This guide includes those that are encountered most often. Plants, herbs, and grasses are organized as described in the following paragraphs.

* Holdridge, L.R., et.al., Forest Environments in Tropical Life Zones: A Pilot Study, London, Pergamon Press, 1971.

Figure 1. Successional Stages of Vegetation in the Gamboa Area Forest.

In the foreground is a fresh-water lagoon choked with the water weed, Hydrilla. The lake shore is ringed with grasses (Andropogon bicornis) and the oil palm (Elaeis oleifera). A strip of short forest has grown up on an abandoned field which is dominated by Cecropia, Cochlospermum, and Trema. Behind this, a tall second-growth forest rises, featuring the spreading white branches of Ficus sp., Enterolobium cyclocarpum, and an emergent, leafless Cavanillesia platinifolia.

Plants are organized by leaf size: trees with the largest leaves are at the beginning, and trees with small, feathery leaves are toward the end.

The next section includes palms and understory herbs. The largest palms are first, followed by understory palms and large herbaceous plants.

Finally, seven of the largest, most distinctive grasses encountered in the Gamboa area are described.

C. FORMAT OF SPECIES DESCRIPTIONS

For each species, a written description is on the left-hand page, with a drawing on the right, facing page. The top of each written description identifies the plant's scientific name (genus, species) on the left, the common name in the center, and the plant family name on the right. Often, there are many common names for any given plant; in this guide, only the most common names are provided. Common names often cause confusion--several species sometimes share the same common name, and the same species may be called by different names in different regions.

All drawings are organized alike: Clockwise, from the upper right, is a sketch of a branch showing the leaf arrangement. Below this is a close-up of one leaf showing its general shape and major veins. Flowers and fruits are at the bottom of the page, with the fruit on the right and the flower on the left. If the flower is not distinctive from a distance, as is often the case, it is not included. Finally, a silhouette of the tree, emphasizing unique aspects of its shape, is outlined on the left side of the page. The line for scale is 2 meters high. Some key characteristics are written by each of the drawings for quick reference. These are marked with an asterisk if they can be used as unique characteristics for identification.

The written descriptions are organized into four basic sections. Leaves are described first: average leaf dimensions are given, but leaf size is variable and should be used with caution as an identifying mark; young plants, shaded plants, and sucker sprouts have larger leaves than mature individuals in the canopy. Next is a description of Tree Shape and Trunk, which includes a range for the maximum height attained, and covers characteristics of the sap and bark (bark characteristics can change dramatically with tree age). Flowers and Fruits, and the seasons in which they are found, are described next. Although flowers and fruits are not always present, they are the best characteristics to use for making positive identifications. The terms describing flowers and fruits are used loosely and not in their strict botanical sense. The section on Abundance and Habitat gives a ranking of abundance using five relative categories: very common, common, frequent, occasional, and rare. The three types of habitats considered are mature forests (areas with large trees, an open understory, and no major disturbances in the last 100 years), secondary forests (younger forests with smaller trees and more undergrowth), and disturbed areas (open areas which have been cleared recently by human or natural destruction). Some descriptions have a section on Similar Species where species which are confused easily, and hints on how to tell them apart, are given.

The guide uses as few technical terms as possible; those that are used are described in the glossary and illustrated in figures 2 through 5.

D. HINTS FOR IDENTIFICATION

It is difficult to see leaves clearly when they are in the canopy. Although this guide emphasizes tree shape and gross aspects of leaf shape, identification is easier with a leaf or fruit in hand. Often, trees have sucker sprouts or small branches near the ground; look for these. At certain times of the year, dead leaves or fallen flowers and fruits may be found on the ground near the tree.

Opposite leaves are a good identifying characteristic because not many species have them. If the leaves cannot be seen clearly enough to reveal this characteristic, look at the smallest twigs. If the smallest twigs branch opposite to each other, so do the leaves. Some species with opposite leaves are listed below.

- Alseis blackiana (Mamecillo)
- Faramea occidentalis (Bonewood)
- Tabebuia rosea (Roble blanco)
- Byrsonima crassifolia (Nance)
- Miconia argentea (Dos caras)
- Vismia macrophylla (Sangrillo)

Some general seasonal characteristics of the Gamboa forest may help identify plants. The climate is characterized by high amounts of rainfall; however, during the dry season (mid-December through April or May) rainfall is very low. The dry season affects many plants: some plants lose their leaves for part or all of the dry season; some unique plants lose their leaves during the wet season. Table 1 lists plants by which season they lose their leaves.

TABLE 1. WHEN PLANTS LOSE THEIR LEAVES

Plants that Lose Their Leaves	
In Wet Season	In Dry Season
Cordia aliodora (Laurel)	Annona spraguei (Cherimoya)
Ochroma pyramidale (Balsa)	Apeiba tibourbou (Monkey comb)
Tabebuia rosea (Roble blanco)	Bursera simarouba (Gumbo limbo)
Tachigalia versicolor (Tachi)	Byrsonima crassifolia (Nance)
Triplaris cumingiana (Long John)	Cavanillesia platinifolia (Quipo)
	Ceiba pentandra (Ceiba)
	Cochlospermum vitifolia (Poro-poro)
	Enterolobium cyclocarpum (Guanacaste)
	Erythrina fusca (Gallito)
	Luehea seemannii (Guacimo)
	Pseudobombax septenatum (Barrigon)
	Sapium caudatum (Olivo)
	Spondias mombin (Monkey plum)
	Sterculia apetala (Panama)
	Tabebuia rosea (Roble blanco)
	Terminalia amazonica (Amarillo)
	Zanthoxylum species (Prickly-yellow)
	Zuelania guidonia (Cagajon)

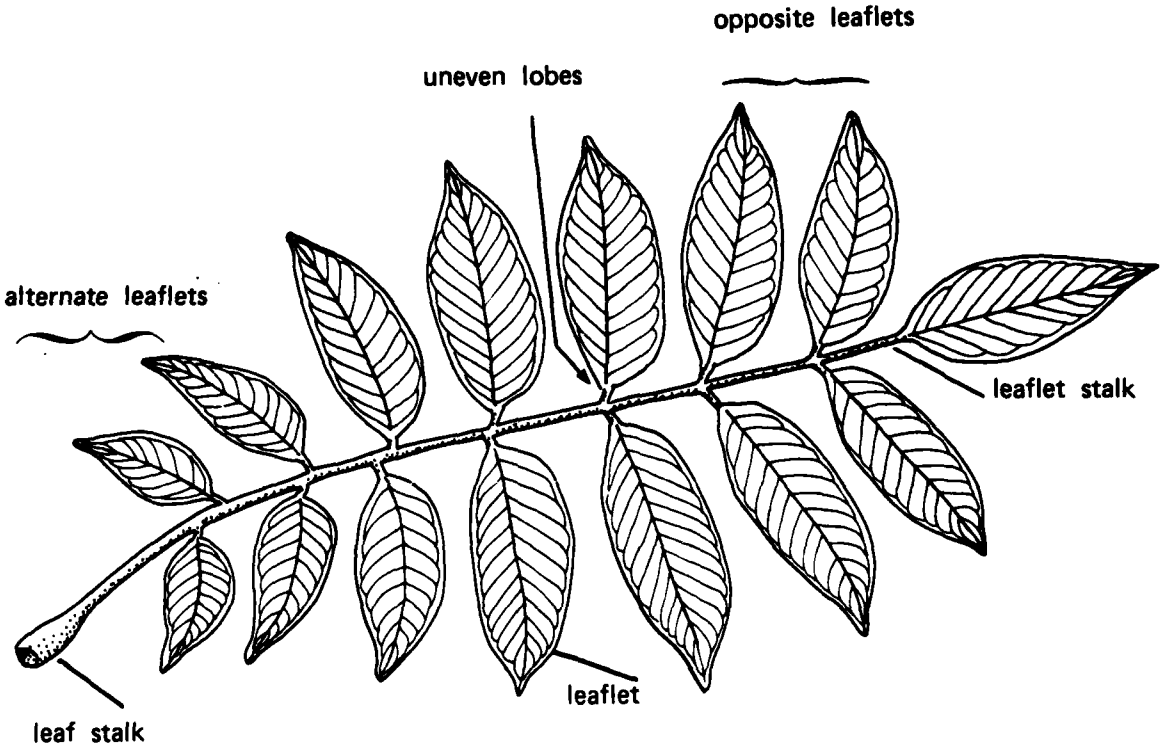

Figure 2. Pinnately Compound Leaf.

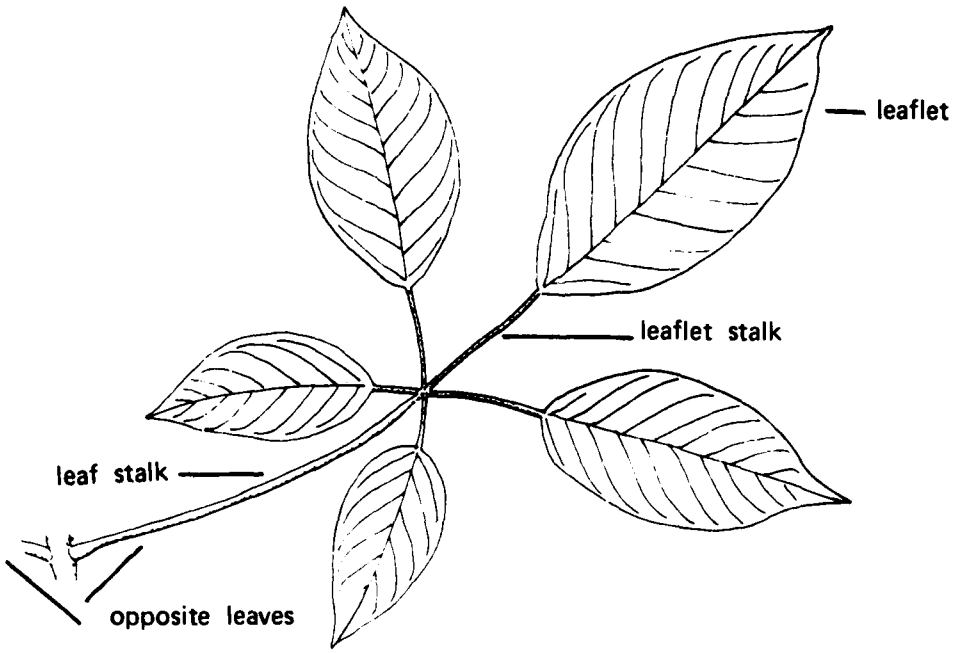

Figure 3. Palmately Compound Leaf.

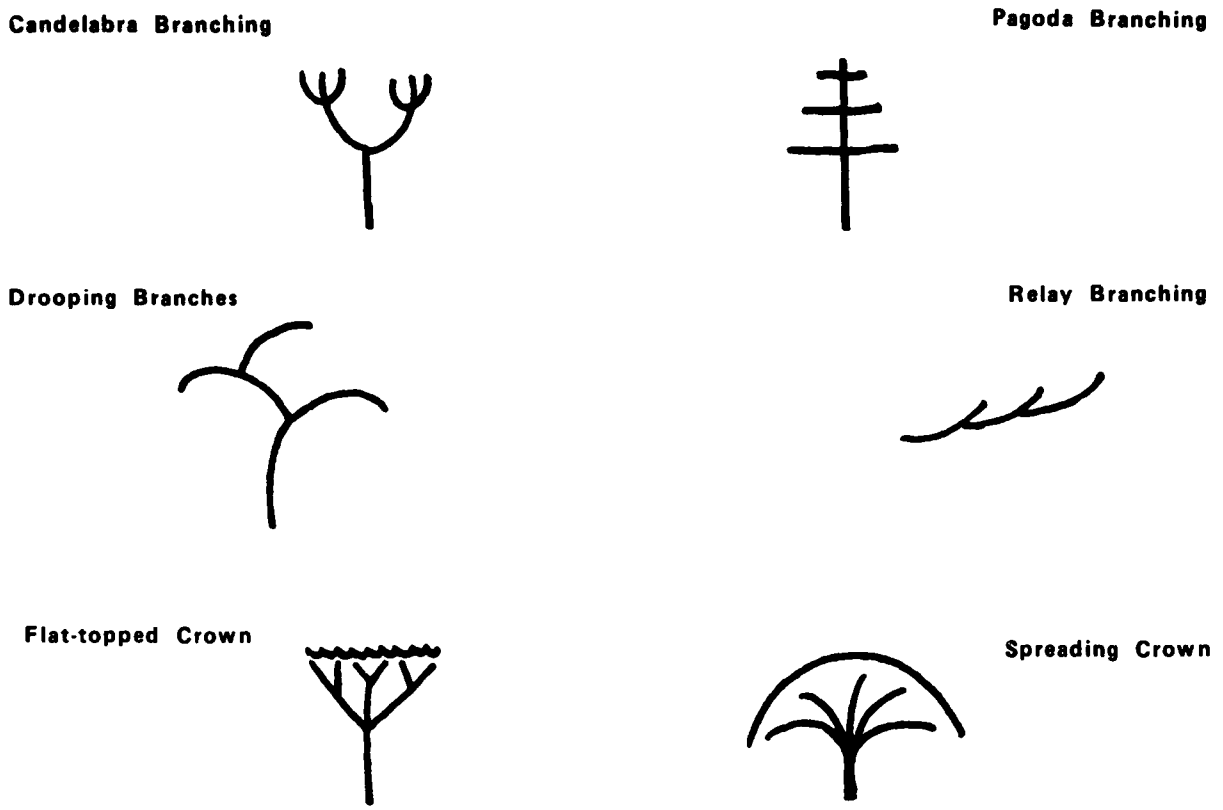

Figure 4. Picture Glossary of Tree Shapes and Branching Patterns.

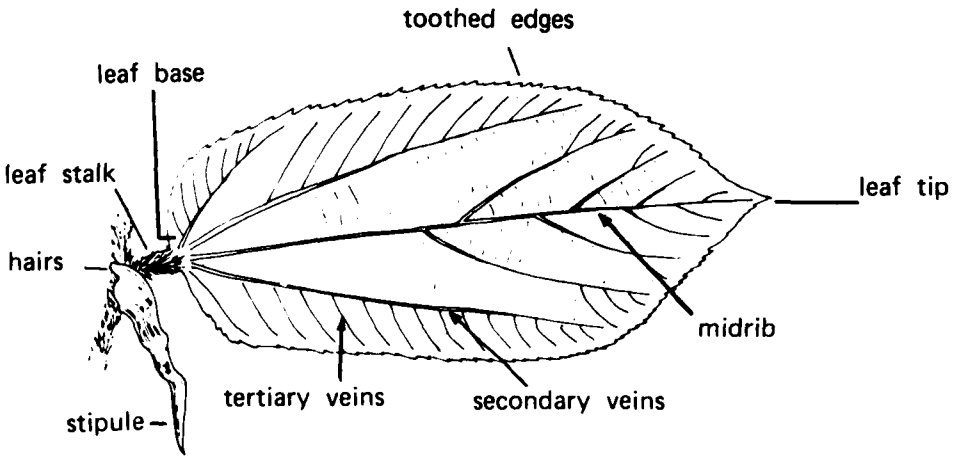

Figure 5. Simple Leaf.

SECTION 2. VEGETATION DESCRIPTIONS

Part A. Trees and Shrubs

Gustavia superba — Membrillo — Lecythidaceae

Leaves

Leaves are simple, alternate, large (90 by 25 cm), and coarsely toothed. They are widest beyond the middle, with a pointed tip and tapered base. The midrib is raised and the blade is slightly rippled. The large leaves hang down, clustered at the ends of thick branches.

Tree Shape and Trunk

This is a sub-canopy tree (6 to 12 m), with a narrow, flexible trunk and infrequent, candelabra-like branches. The bark is light-colored and smooth, with raised rings around the trunk.

Flowers and Fruits

From March through June, flowers are borne on small stalks just below the leaves. They are large with cream-colored or lavender-tinted petals, and a thick ring of stamens clustered in the center. The fruits, which are seen from June to August, are large (8 cm), fleshy, green, and round, with a raised ring flattening one side. There are approximately four seeds inside the fruit, which usually are carried away and eaten by mammals.

Abundance and Habitat

This tree is very common in moist, mature forests.

Similar Species

Alseis has opposite leaves less than half as long as, and with smoother edges and longer leaf stalks than, Gustavia.

Anacardium has much shorter and thicker leaves with smooth edges and rounded tips. The branching pattern of Anacardium is not candelabra-like.

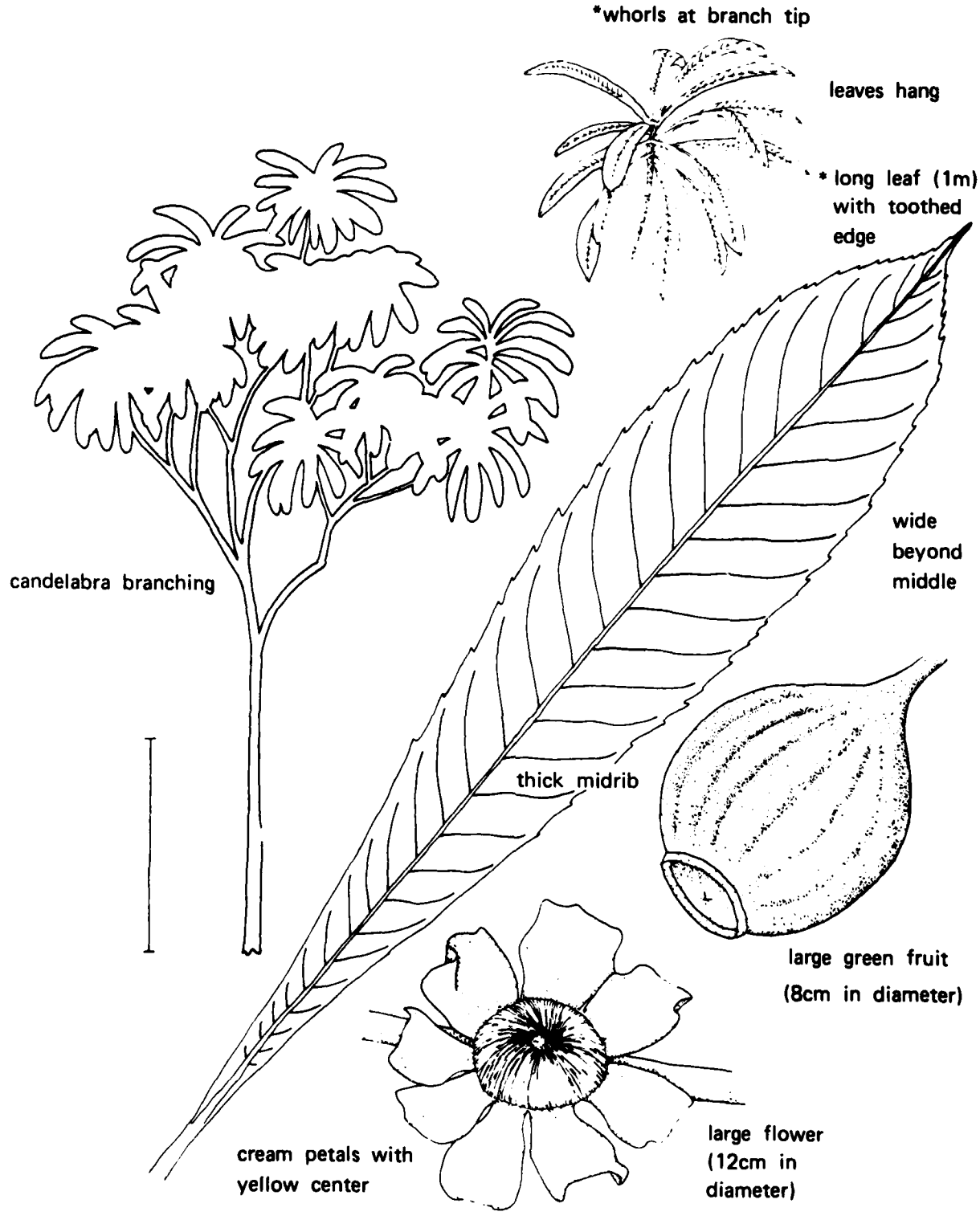

Figure 6. *Gustavia superba.*

Cecropia species | Guarumo | Moraceae

Leaves

Leaves are large (60 cm) and simple, with distinct lobes. There are four common species which vary in the number of lobes (7 to 15) in their leaves and in how far to the center they are indented (less than 1/2 to more than 3/4). The leaf stalk attaches to the middle of the leaf, like an umbrella, and is quite long (up to 26 cm). Often, the leaf is pleated with the edges of the lobes folded up. The undersides have a mat of whitish hairs. The leaves are arranged in a spiral at the ends of thick branches so that the crown is patchy and sparse. Dead, curled leaves are often conspicuous on the ground.

Tree Shape and Trunk

The tree is approximately 15 meters tall, with a slender main trunk and few thick branches. The leaves, clustered at branch tips, give the tree a very characteristic sparse, angular, stick-like look. The trunk is light-colored and smooth with horizontal rings. The base often has stilt roots. The wood is very soft, and stinging ants live inside the hollow trunk.

Flowers and Fruits

The year-round flowers and fruits look very similar. Clusters of 4 to 40 grey-brown fingers (4 to 20 cm long) hang down from the branch tips (figure 7).

Abundance and Habitat

This tree is common in disturbed habitats of both moist and dry forests. Cecropias are fast-growing, high-light-requiring species. They are one of the first to colonize disturbed areas, and are good indicators of a very young forest.

Similar Species

There are four species of Cecropia encountered in the Gamboa test area, all typical of young forests. They can be distinguished by color, length and number of fruits, and by the number and length of leaf lobes.

Cochlospermum has a five-point leaf with toothed edges; the leaf stem attaches to the leaf edge.

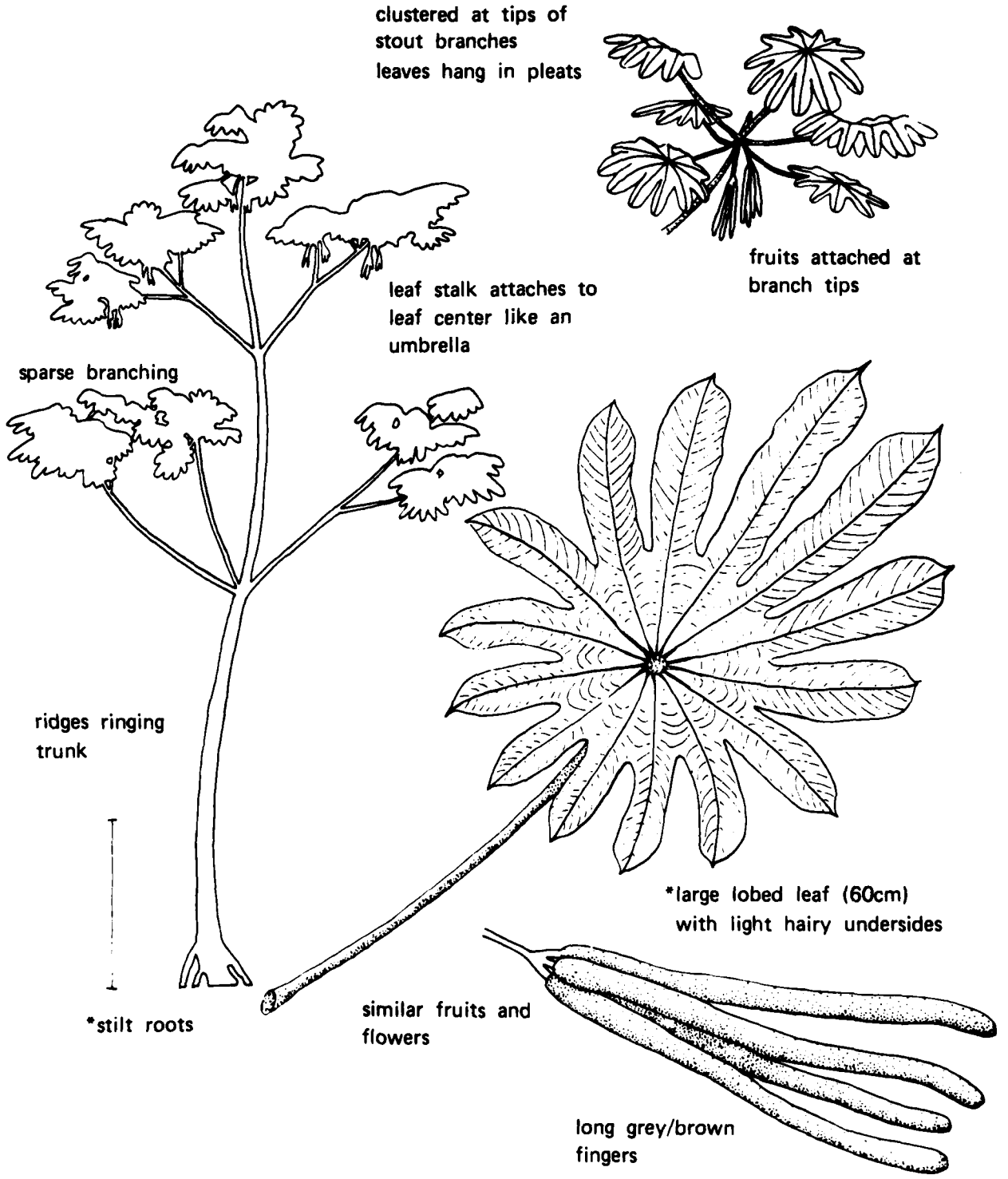

Figure 7. *Cecropia* species.

Sterculia apetala Panama Sterculiaceae

Leaves

The alternating leaves are large (35 by 45 cm), with three to five lobes and rounded tips. The leaf base is very lobed, and the two sides of the leaf overlap. The leaf stalk is long (25 cm) and hairy. The leaves have a very distinctive way of hanging down in pleats, with the two edges of each lobe folded together. The tree is leafless from January to February.

Tree Shape and Trunk

The main trunk is large with branches fanning out low to the ground. The buttresses leave the trunk high up and are sometimes arched so that the leading edge parallels the trunk to the ground. Tree height is about 40 meters. The bark is white and appears smooth, although it is sand-papery to the touch. The cut bark has a strong smell.

Flowers and Fruits

In February, bell-shaped flowers (2 cm), with curved, pointed tips, bloom (figure 8). The flower is greenish-yellow, with dense purple or maroon hairs on the outside. Flowers are clustered on branched spikes along the branches.

Between January and April, 1 year after flowering, fruits develop. The light brown, hard, woody fruits (8 by 5 cm), are attached by one end, in groups of five, to an outer stem. When they split open, inside is a layer of orange stinging bristles, surrounding two to four oblong seeds (2 cm), also covered with stinging bristles.

Abundance and Habitat

This tree is found occasionally in mature moist and dry forests.

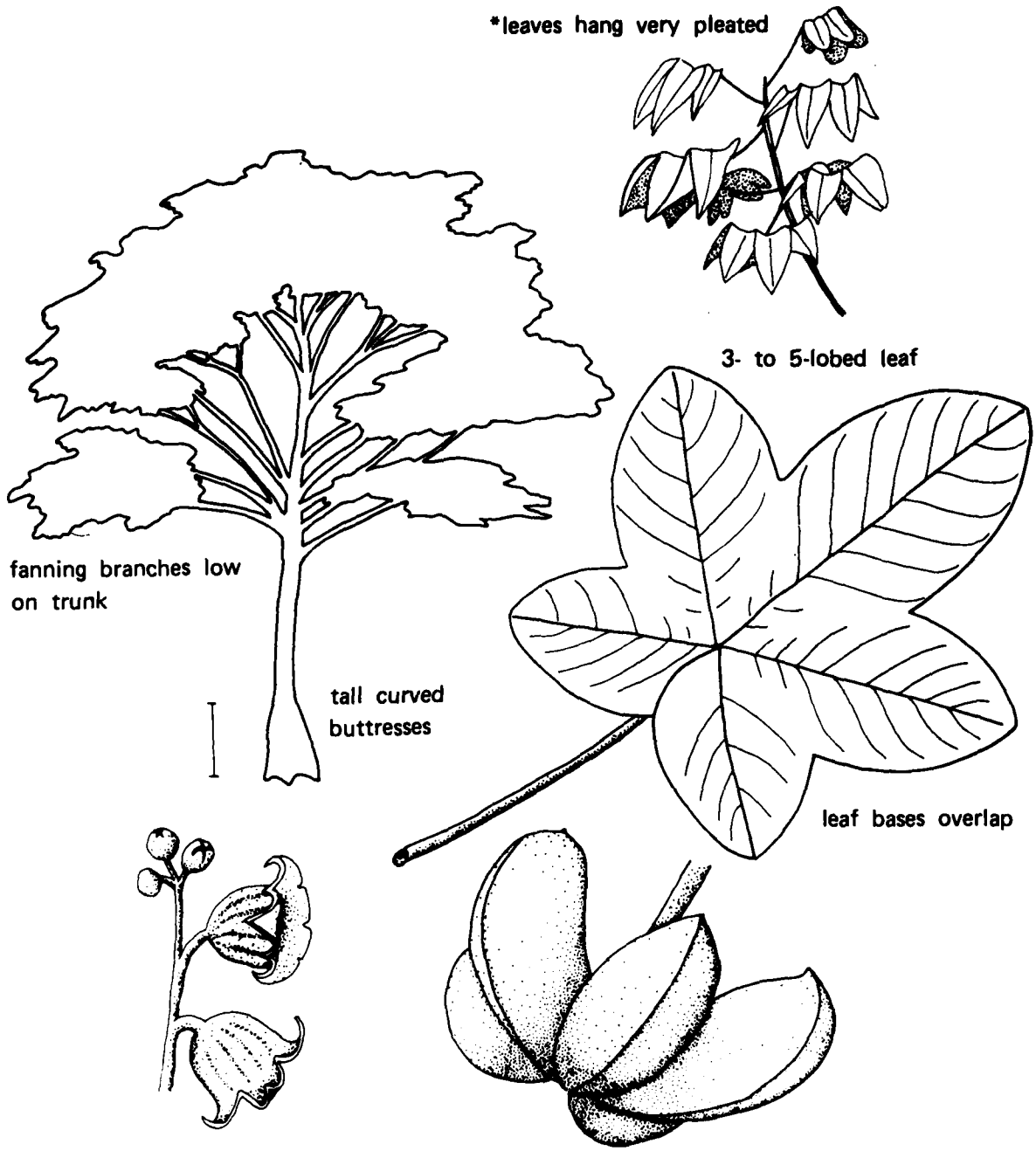

Figure 8. *Sterculia apetala.*

Cavanillesia platinifolia — Quipo — Bombacaceae

Leaves

The leaves are simple, alternate, and large (30 by 30 cm), with long (20 cm) leaf stalks. They can be either oval or heart-shaped, with three to seven points. The leaf base is dramatically heart-shaped; undersides are furry. The leaves are clustered at branch tips, falling off in December and growing again in May.

Tree shape and Trunk

This tall tree (40 m) has a very distinctive shape and often rises above the rest of the canopy. Large branches come out at right angles near the top of the thick trunk to form a small, round crown.

The trunk has a smooth, light-grey bark, with raised rings banding the trunk at 1- to 2-meter intervals. The trunk bulges just above the base. Slapping the trunk with the palm of your hand produces a hollow, watery sound. At the ground, the trunk base spreads to look like elephant toes.

Flowers and Fruits

From March to April, flowers (3 cm) are clustered at the branch tips. The flower is a hairy, bell-shaped cup, with five red petals and many red stamens. There are no leaves when the tree is in flower; at a distance, the tree appears red.

During April and May, large (15 cm in diameter), red and green fruits appear. These fruits turn light tan after falling from the tree. Fruits have a hard seed in the center, with four to five intersecting, paper-type wings around it. The fruits are wind dispersed, but most land below the parent tree. The tree is leafless when in fruit, so the large fruits are conspicuous and adorn the tree like Christmas tree ornaments. These features are shown in figure 9.

Abundance and Habitat

This tree is found occasionally in moist forest, but more frequently on dry ridge tops. Often, the tree's presence is an indicator of limestone soils.

Similar Species

From a distance, Ceiba may look like Quipo because they are both large, often emergent, trees with grey bark. However, Quipo has very smooth bark and a smaller crown.

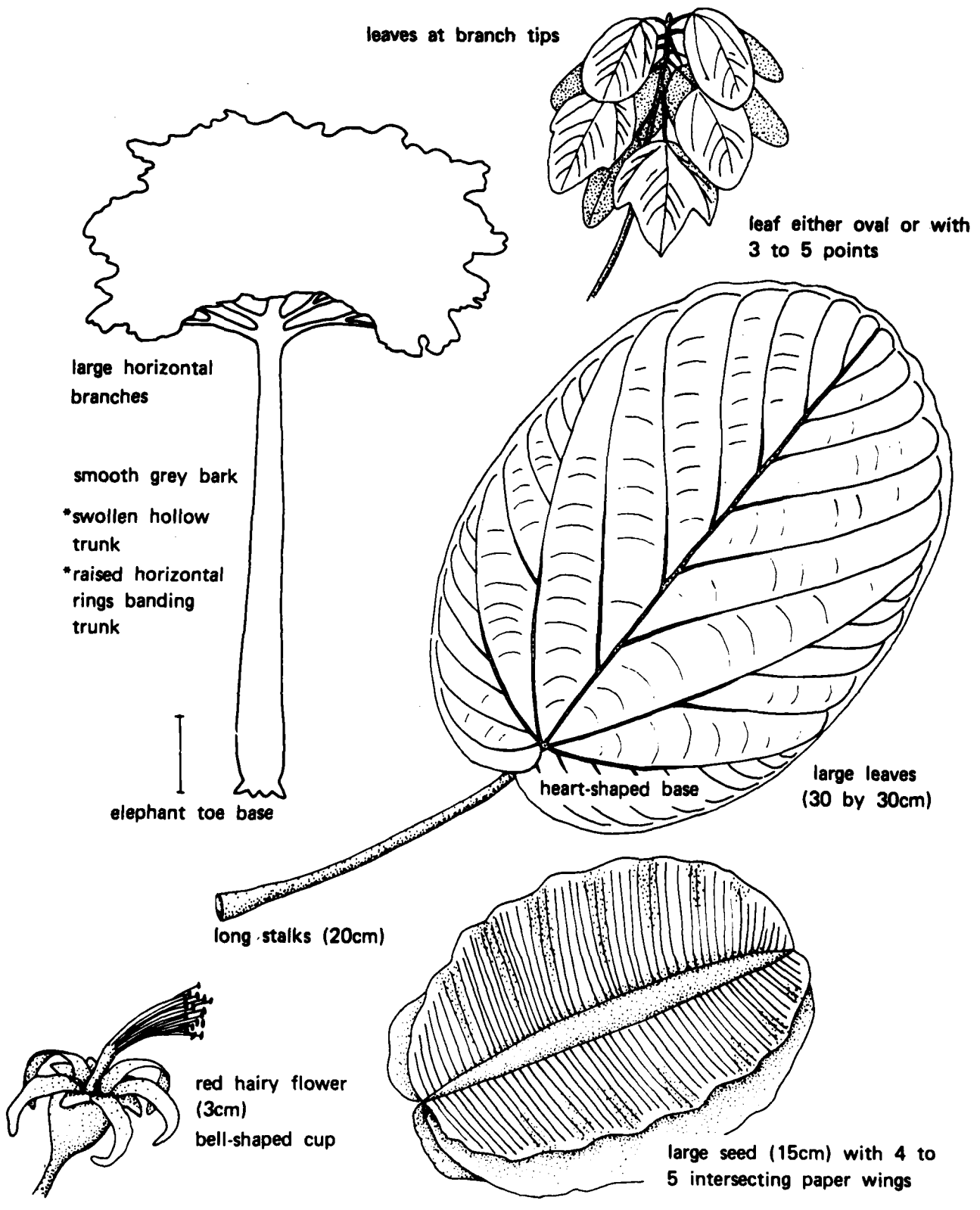

Figure 9. *Cavanillesia plantinifolia.*

Ochroma pyramidale — Balsa — Bombacaceae

Leaves

The leaves are simple, alternate, large (30 by 20 cm), and heart-shaped, with three to five points. Leaf stalks are long and thick. The leaves, clustered at the ends of branches, are pale green, with dense hairs on the lower surface. Young trees and saplings have bigger leaves than adults. The tree is leafless from June to August.

Tree Shape and Trunk

This is a small tree (12 m). The young trees are pagoda-shaped, with long, straight branches. Leaves, clustered at the branch tips, give the tree a sparse, patchy appearance. The branch tips are covered with a light brown fuzz. The trunk is smooth and light-colored, and the wood is very light-weight.

Flowers and Fruits

Flowers bloom on long stalks (15 by 5 cm) from November through March. The flowers have whitish petals and a spirally twisted center. They open at night and are generally closed the next day.

The fruit can be found from February through August. Many small seeds are embedded in a long (25 cm), fluffy white stalk, which stands erect at the ends of the branches. These features are shown in figure 10.

Abundance and Habitat

This tree is very common in disturbed habitats of both wet and dry areas. They are fast-growing and require direct sunlight.

Similar Species

Cecropia species generally have deep lobes in the leaves, and the leaf stalk is always attached to the center of the leaf.

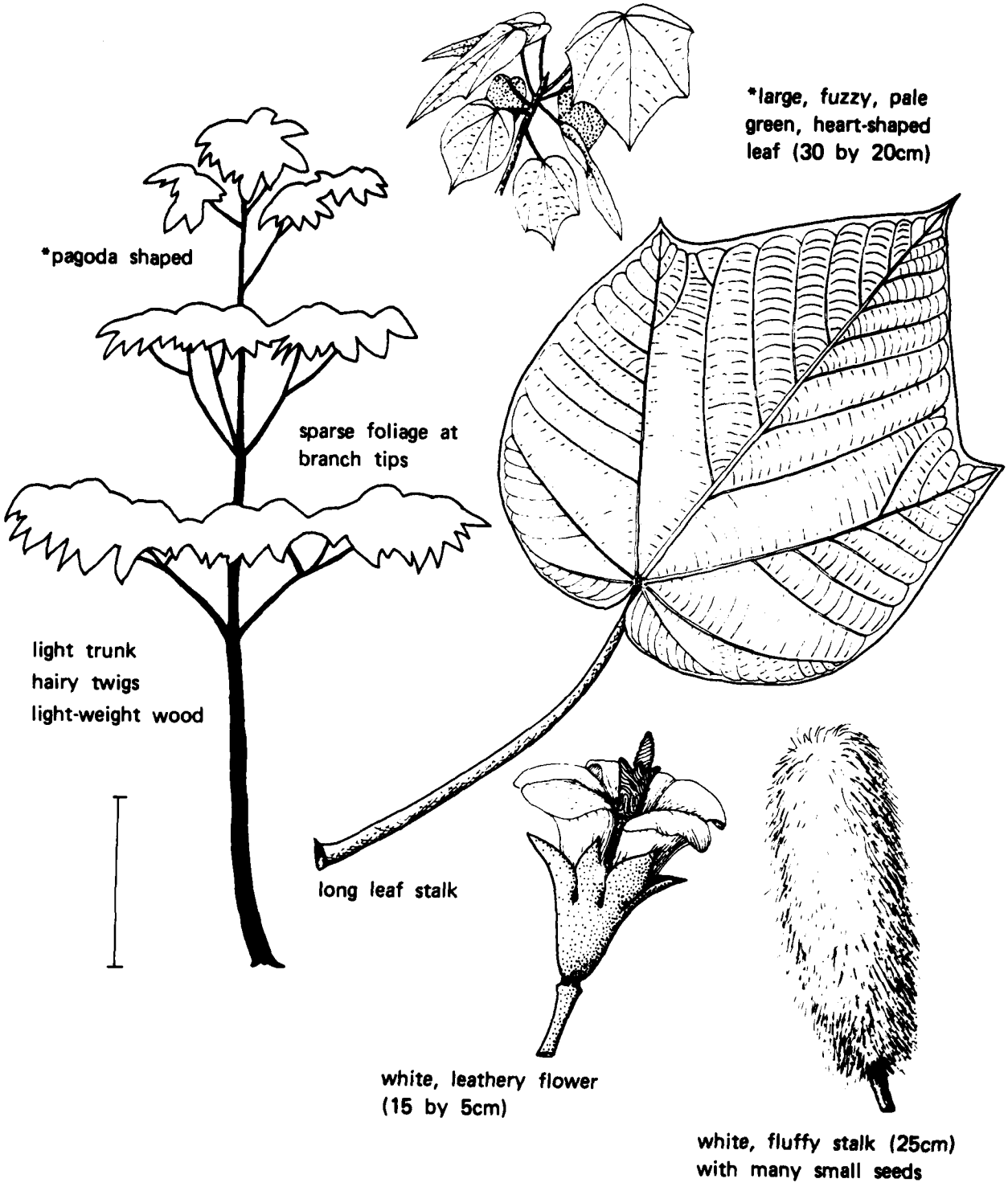

Figure 10. *Ochroma pyramidale.*

Poulsenia armata — Cucua — Moraceae

Leaves

The leaves (25 by 15 cm) are simple, alternate, very thick and leathery, with an uneven leaf base. The leaves grow in clumps; they have very short spines on the lower midrib, the stout leaf stalks, the smallest branches, and the bud at the branch tip. Often, leaves are found on the ground.

Tree Shape and Trunk

The tree has short, curved side branches. Its general shape is like a narrow tube. The trunk is twisted, with distinctive, asymetrical buttresses which often curve back into the tree without reaching the ground; the top edges of the buttresses are yellow. The thin, grey bark yields a copious milky-yellow sap when cut.

Flowers and Fruits

Year-round, very small, inconspicuous yellow flowers (in dense globular clusters) and green, globular (3 cm) fruits are scattered along the branches. The fruits have sharply pointed star-shaped tips. These features are shown in figure 11.

Abundance and Habitat

This tree is seen frequently in moist mature forests.

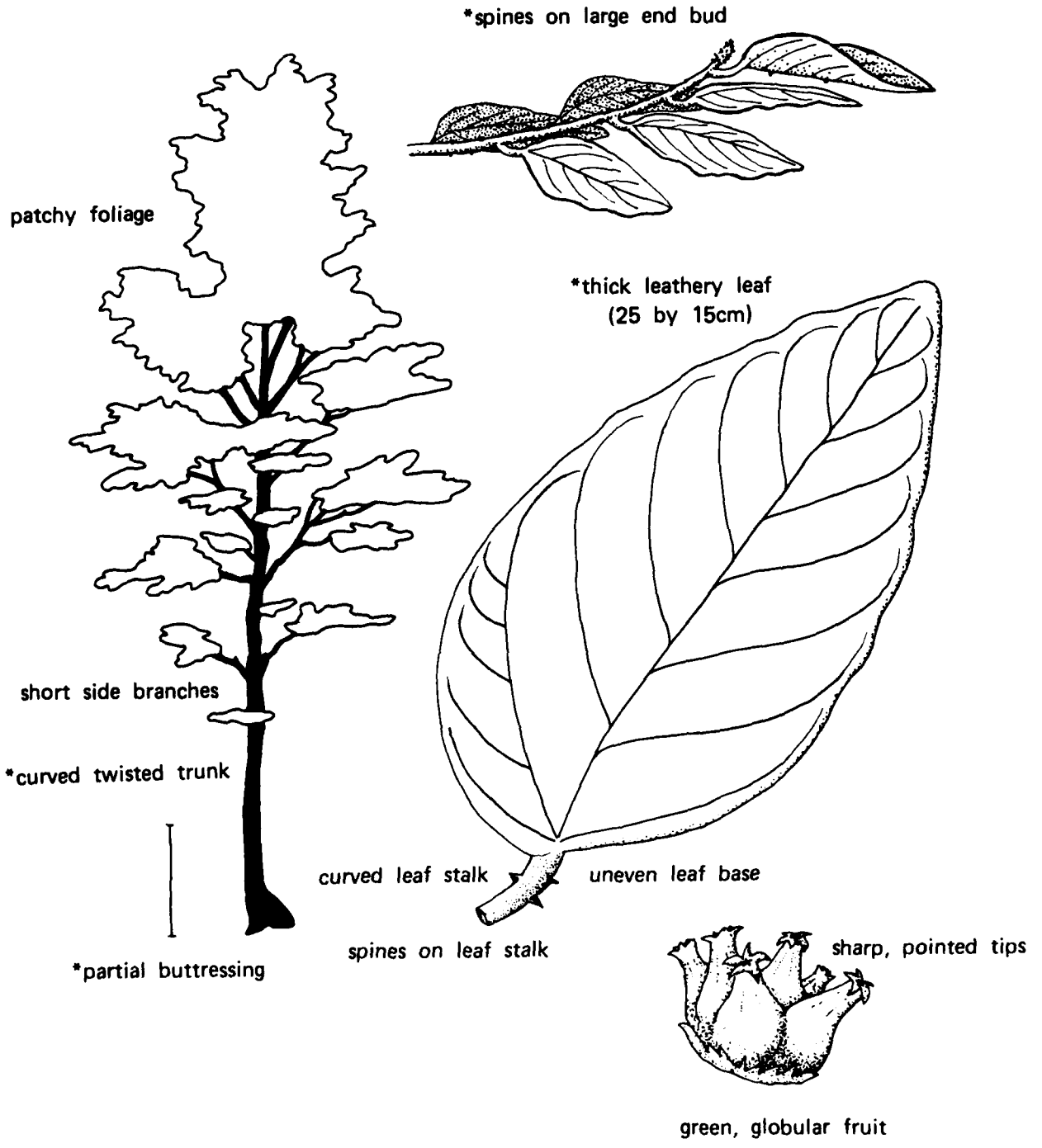

Figure 11. *Poulsenia armata.*

Miconia argentea — Dos Caras — Melastomaceae

Leaves

The leaves (25 by 15 cm) are opposite, simple, toothed, and broadly elliptical, with a short pointed tip. Approximately five major veins run from base to tip; secondary veins run perpendicular to the major veins, creating a prominent ladder pattern. Very dense, white hairs grow on the underside of the leaf. The youngest leaves point up so that the white undersides of these leaves are obvious from a distance.

Tree Shape and Trunk

This is a slender tree (15 cm), with relay branching and a flat-topped crown. The trunk is light tan with thin, shaggy bark.

Flowers and Fruits

From December through May, small, inconspicuous white flowers are displayed on branched spikes at the ends of branches. These flowers are replaces with small, round berries (0.5 cm in diameter) from June to January. The berries are green when young and turn purple at maturity. These features are shown in figure 12.

Abundance and Habitat

This tree is very common in moist and dry forests, particularly in sunny areas and secondary forests.

Similar Species

There are many other species of Miconia which are common shrubs or herbs. All have the distinct ladder venation, but generally they are not white on the undersides of the leaves.

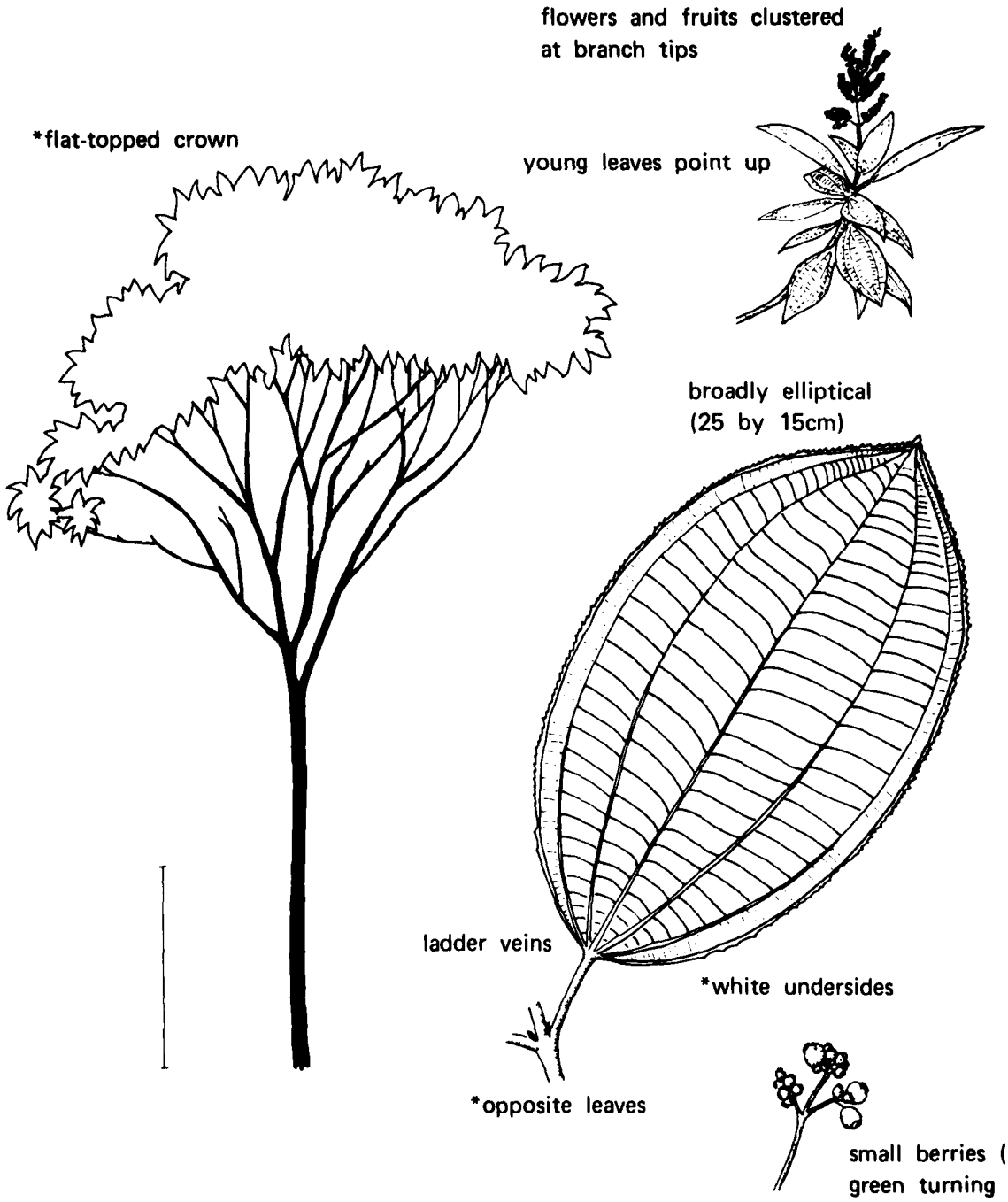

Figure 12. *Miconia argentea.*

Vismia macrophylla — Sangrillo — Guttiferae

Leaves

The leaves are simple, opposite, long (25 by 8 cm) and droopy, and heart-shaped. The midrib and secondary veins are raised on the lower leaf surface. The leaf undersides are covered with orange hairs.

Tree Shape and Trunk

Tree height is about 12 meters. The trunk and branches are thin, and the sparse branching gives the tree a spindly look. The bark is redish-brown, very loose, and shaggy. When cut, the bark oozes orange sap.

Flowers and Fruits

From May through August, white flowers (12 mm) with purple streaks bloom in clusters at the ends of the branches. From September through December, clusters of olive-brown berries (1.5 cm), with many redish-brown seeds (3 mm), are found at the ends of branches. These features are shown in figure 13.

Abundance and Habitat

This tree is found frequently in wet and dry areas, in both disturbed areas and in young forest.

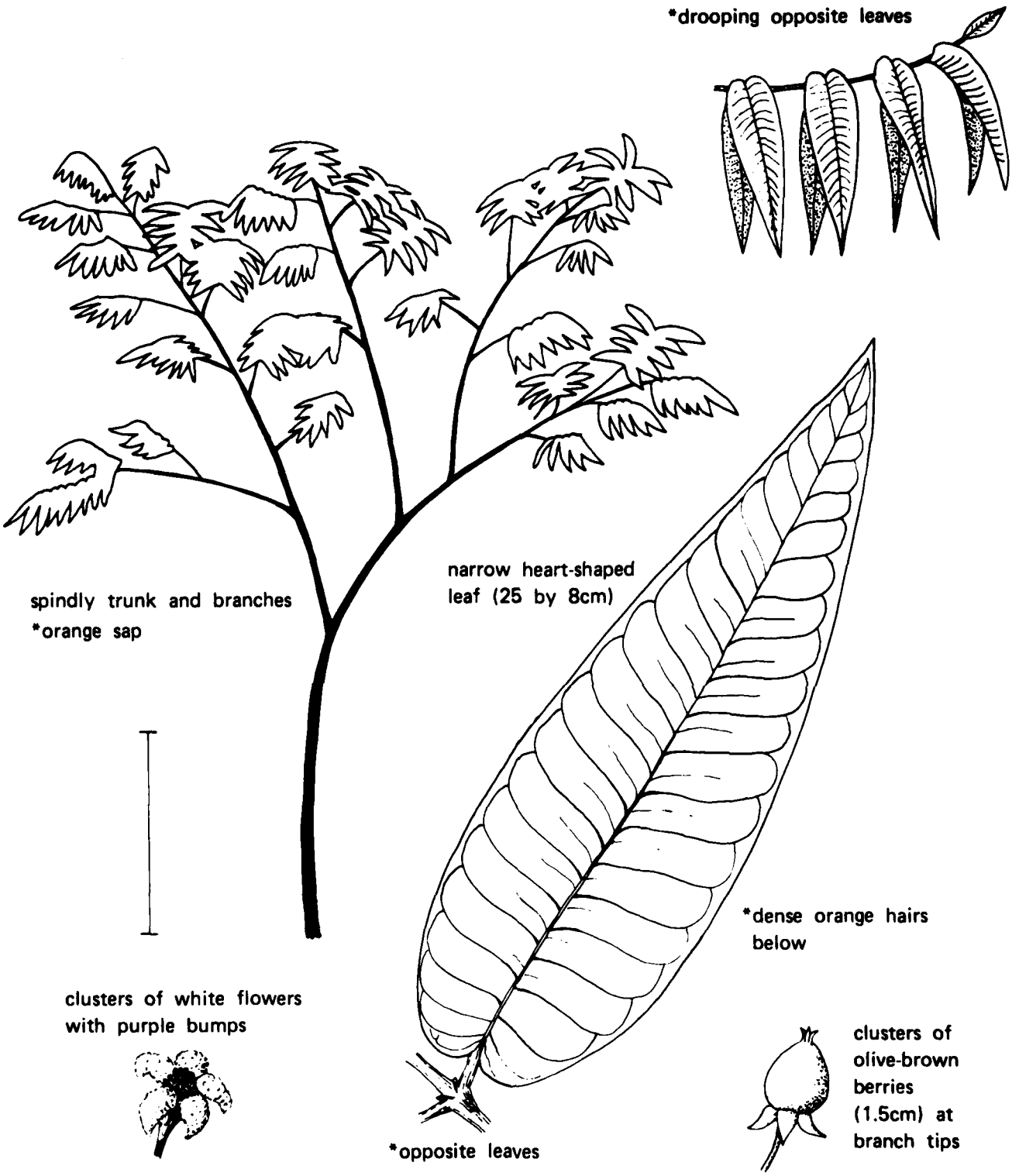

Figure 13. *Vismia macrophylla.*

Anacardium excelsum — Cashew, Espave' — Anacardiaceae

Leaves

The leaves are simple, alternate, and large (25 by 8 cm). They are tapered at the base, widest beyond the middle, and have rounded tips. The dark green leaves are thick and heavy, with short, thick leaf stalks, and cluster in whorls at the ends of branches. These features are shown in figure 14. In contrast with the dark leaves, the midrib and secondary veins are prominent and light colored. The crushed leaves smell like mangos.

Tree Shape and Trunk

Tree height ranges from 15 to 40 meters. The trunk is fairly thin and long, and the crown is small with dense foliage. The larger trees are buttressed slightly. The dark, coarse bark has deep, vertical grooves and flakes off in patches. The cut bark sometimes oozes red sap.

Flowers and Fruits

From February to April, sprays of small white, or light green, flowers appear at the tips of branched stalks. From a distance, a flowering tree has a light, fuzzy appearance. The flowers have a strong clove-like smell. From March to May, green nuts are borne on curved, fleshy stalks (3 by 0.5 cm). The stalks are eaten by monkeys; once the nuts are cooked, humans eat them--uncooked, the nuts are poisonous.

Abundance and Habitat

This tree is found occasionally in moist, mature forests.

Similar Species

Anacardium occidentalis is a smaller, cultivated tree (not common to the forest) which produces the edible cashew.

Alseis has leaves which are opposite and longer, with pointed tips. Its trunk is lighter with flaky bark.

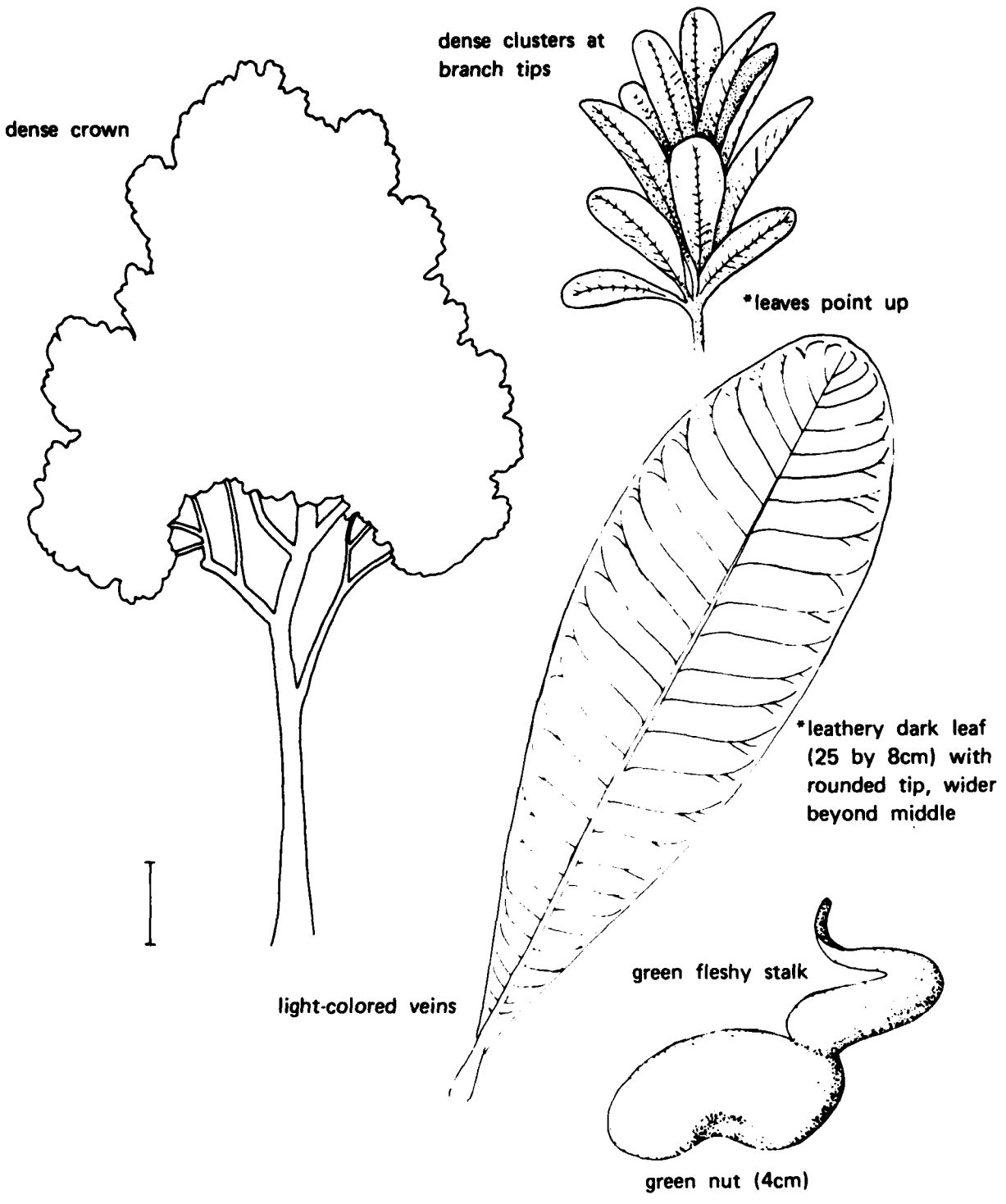

Figure 14. *Anacardium excelsum.*

Didymopanax morototoni — Mangabe — Araliaceae

Leaves

The leaves are very large and palmately compound, with 7 to 12 leaflets (25 by 10 cm) per leaf. The leaflets, on stalks approximately 9 centimeters long, branch from the center attachment like spokes of a wheel. The main leaf stalk can be 1 meter long. Leaflets have pointed tips and heart-shaped bases. The leaves are clustered at stout branch tips; main leaf stalks tend to point up and the leaflets hang down, especially in younger leaves. The undersides of the leaves are a very distinct rusty gold and can be spotted from a good distance, particularly when the wind turns the leaves over.

Tree Shape and Trunk

This slender tree is about 25 meters tall. The branches tend to divide into pairs (dichotomous branching). The leaves are arranged in one layer at the top of the tree, creating a very flat-topped look. The outer bark is thin, and has many small, raised vertical streaks. Old leaf scars can be seen as raised ringer or triangles. The sap has a sweet strong odor.

Flowers and Fruits

From August to December, small (2.5 cm) flowers cluster at the tips of branching stalks to give the tree a lacey appearance. From January through May, purple berries clustered at the branch tips. Each berry (1 cm diameter) has two seeds. These features are shown in figure 15.

Abundance and Habitat

This tree is common in disturbed areas and young forest in both wet and dry areas. This relatively fast-growing species is a good indicator of a young forest.

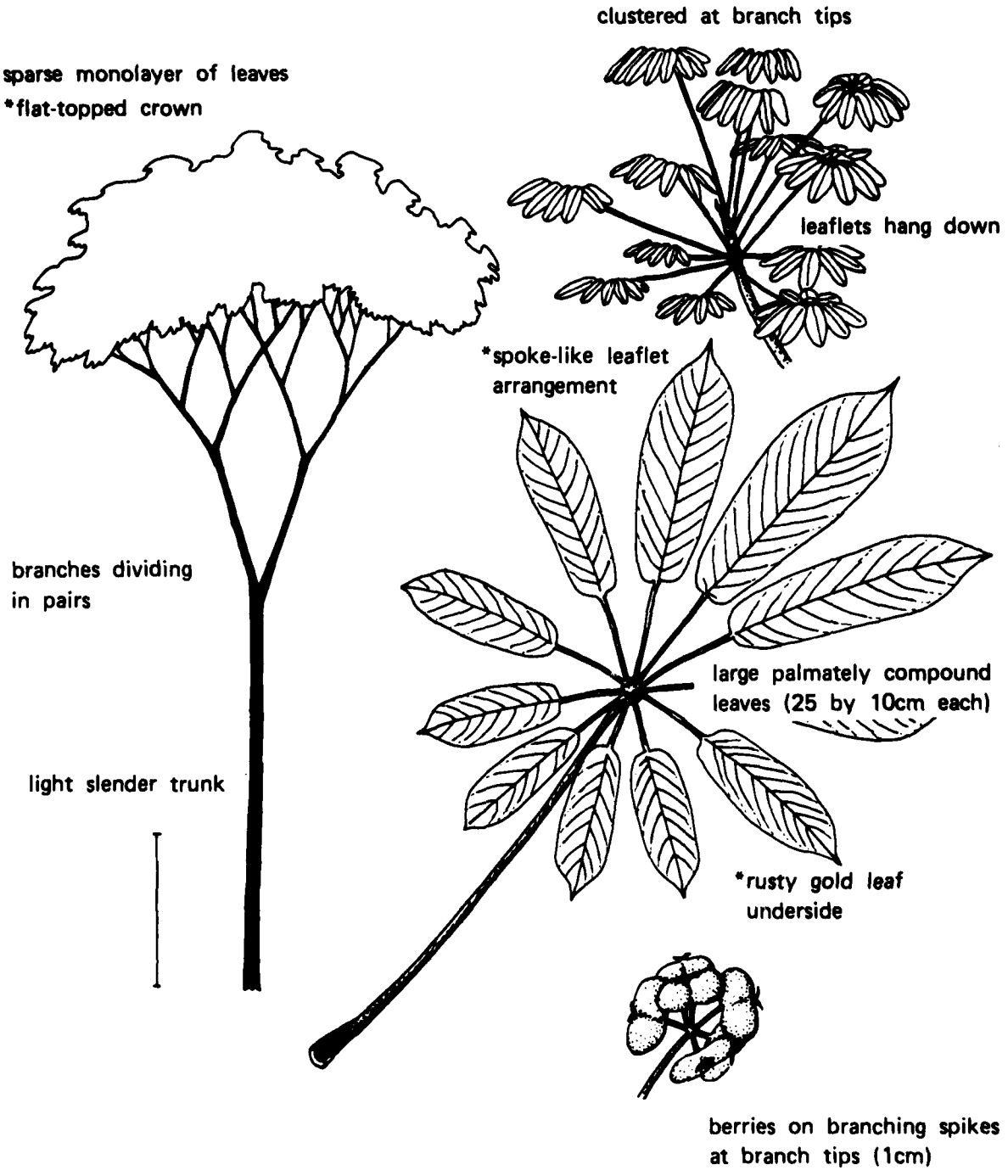

Figure 15. *Didymopanax morototoni.*

Alseis blackiana Mamecillo Rubiaceae

Leaves

The leaves (21 by 7 cm) are simple and opposite, with smooth edges, and cluster at the branch tips. These slender leaves are tapered at the base, widest beyond the middle, and have pointed tips. Often, the leaf blade is slightly wavy. The midrib and secondary veins are raised on the leaf underside.

Tree Shape and Trunk

The tree is approximately 20 meters tall. The light brown trunk has shallow, vertical grooves, and often is fluted with indentations; branches grow crookedly. The bark is thin and flaky.

Flowers and Fruits

From April to May, small (3 mm), yellow to white flowers appear. These sweet-smelling flowers cluster along long spikes (10 to 15 cm) found at the branch tips. The fruits develop from January to March, and reach maturity by June. The brown, capsular fruits (1 cm long) are found along spikes near the branch tips. These features are shown in figure 16.

Abundance and Habitat

This tree is common in moist, mature forests.

Similar Species

Anacardium has alternate leaves (although this is not always obvious from the ground) which tend to be shorter and wider with rounded tips. The trunk of Anacardium is darker with deeper grooves.

Gustavia has alternate leaves which are much larger and have toothed edges. The leaves may be darker in color, and the tips often hang down more.

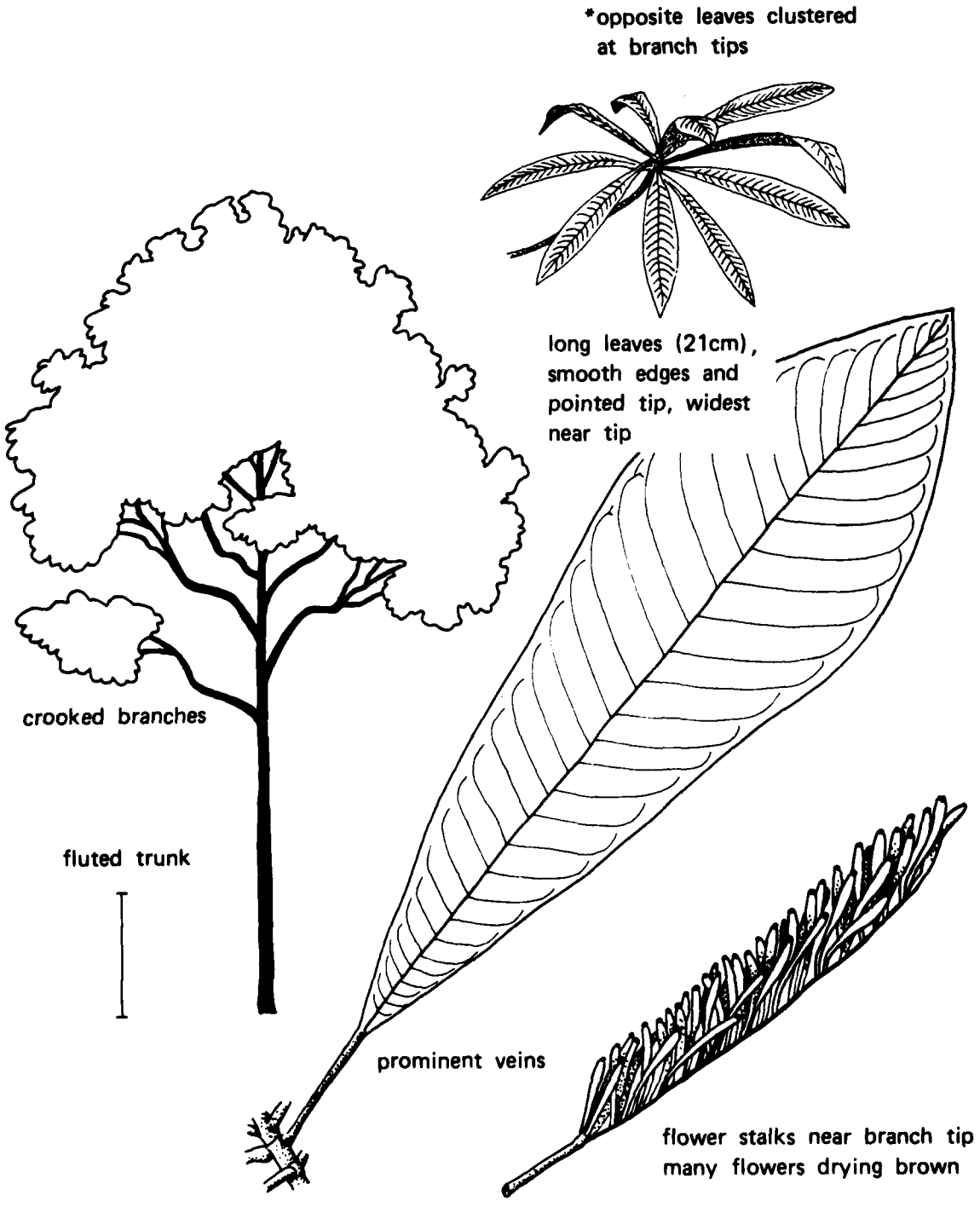

Figure 16. *Alseis blackiana.*

Virola sebifera | Wild nutmeg | Myristicaceae

Leaves

The leaves are simple, alternate, and long (29 by 10 cm), with round bases and pointed tips. Leaf tops are dark green and glossy; undersides are very fuzzy with grey-brown, star-shaped hairs. Leaf stalks are short (1 cm), round, and thick, which allows them to hold the leaves out horizontally from the branches.

Tree Shape and Trunk

Older trees reach to 30 meters, and are buttressed. Branches stick out at right angles from the main trunk like a bottle brush. Several large branches come out at one place in a whorl. The dark brown bark has shallow grooves and flakes off easily. Cut bark produces a reddish, sweet-smelling sap.

Flowers and Fruits

From January to February, and again from July to August, dense clusters of tiny (3 mm) flowers appear on branched stalks all along the branches. Fruits can be found all year long, but peak season is in December. The round, brown, woody capsule (3 cm) splits in half, exposing a brown nut (2 cm), covered by red, fleshy fingers. These features are shown in figure 17.

Abundance and Habitat

This tree is found frequently in mature, moist forests.

Similar Species

Virola surinamensis has a similar tree shape and a leaf similar in size and shape. However, the leaves of Virola surinamensis do not have any hairs.

Zuelania also is shaped like a bottle brush and has leaves of similar size, but its trunk is lighter in color and has many raised white dots.

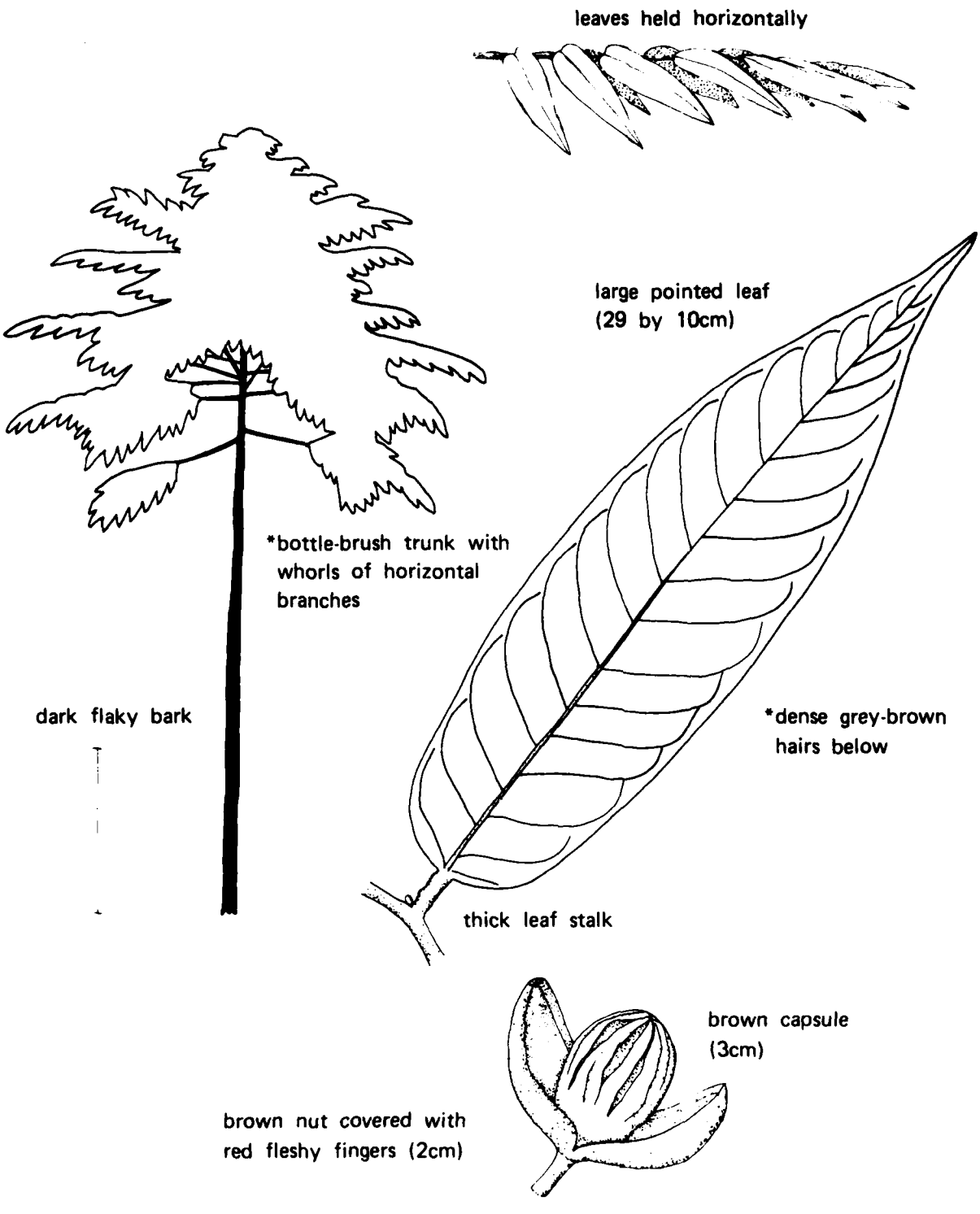

Figure 17. *Virola sebifera.*

Triplaris cumingiana — Long John, Palo Santo — Polygonaceae

Leaves

The leaves are simple, alternate, and long (25 by 8 cm), with tapered bases and pointed tips. These tough leaves have prominent midribs and secondary veins; tertiary veins are evenly spaced and parallel. The leaves often look wavy with ripples between the secondary veins. Very short leaf stalks (less than 2 cm) are attached to twigs at swollen joints. The small twigs are hollow, and have many fine parallel grooves. This tree is unusual because it loses its leaves in July and August.

Tree Shape and Trunk

This tree is approximately 15 meters tall. The long, slender trunk arches up to a small crown, and supports short, drooping branches. Knots and knobs are obvious on the trunk. The smooth, light-colored bark peels off in patches. Aggressive stinging ants live in the hollow younger branches.

Flowers and Fruits

From February to April, long hairy spikes (25 cm) with red flowers (1 cm) appear near the branch tips. The fruits, which appear in March and April, are wind dispersed. These fruits (7 cm) have a swollen base, which holds the seeds, and three pink, curved, papery wings. These features are shown in figure 18.

Abundance and Habitat

This tree appears frequently in a young, moist forest.

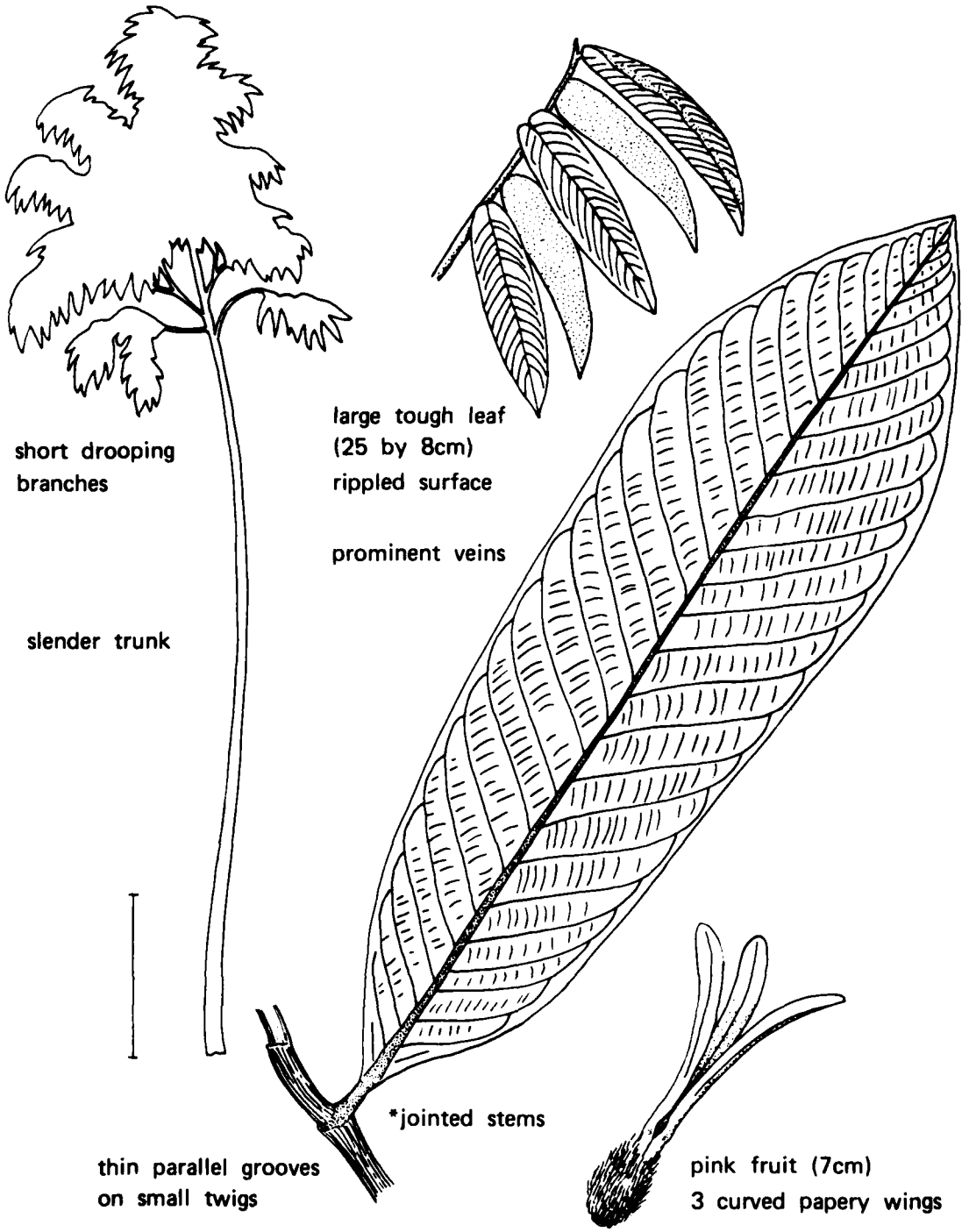

Figure 18. *Triplaris cumingiana.*

Lindackaria laurina — Flacourtiaceae

Leaves

The glossy, green leaves are simple, alternate, and large (20 by 9 cm), with rounded bases and pointed tips. The midrib is raised on the top of the leaf. The leaf stalks are long (8 cm), thin, and bent at the leaf blade and twig, causing the leaf to hang vertically.

Tree Shape and Trunk

This understory tree is about 8 meters tall, with drooping branches and an arching trunk. These features are shown in figure 19. Often, sucker sprouts make the tree appear to have multiple trunks. The bark is smooth and yellow-grey with flaking strips; the inner bark is slightly reddish.

Flowers and Fruits

In May, and again in October, small (5 mm) white flowers appear on branched stalks at the branch tips. From January through March, green fruits (1.5 cm), with many long, flexible spines, appear. These capsules split into three or four parts to expose a grey seed (7 mm), which is partly covered with bright red flesh.

Abundance and Habitat

This tree is found in secondary forests, and occasionally, in moist forests, particularly in sunny areas.

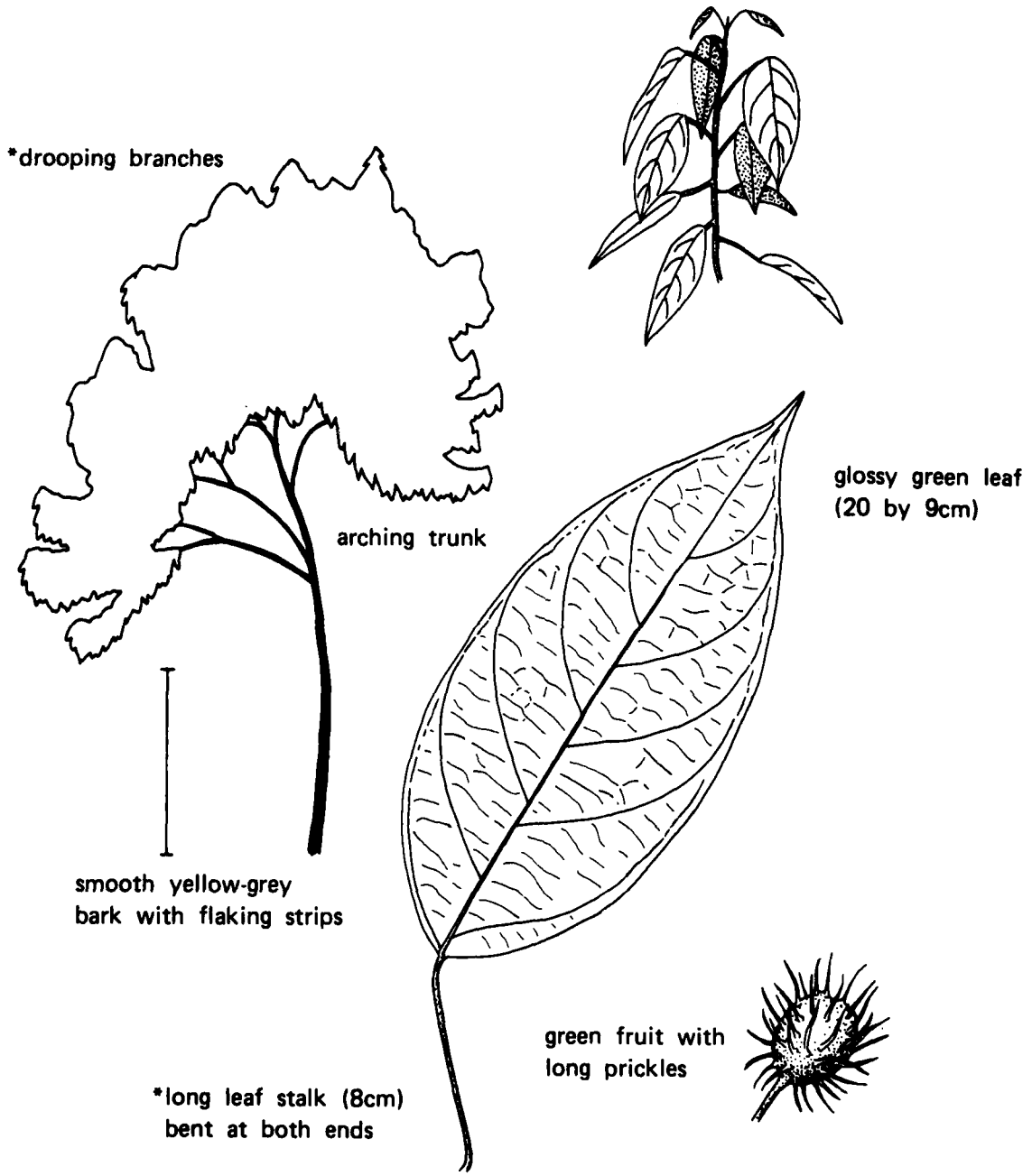

Figure 19. *Lindackaria laurina.*

Pseudobombax septenatum — Barrigon — Bombacaceae

Leaves

The leaves are palmately compound, with each leaflet wider at the tip (20 by 9 cm) and drooping down. The tree is leafless during the dry season.

Tree Shape and Trunk

This tree has a small crown and a height of approximately 25 meters. The base of the tree is swollen, looking like a pot-belly (hence "barrigon" in Spanish). Younger trees (younger than the tree illustrated) have a pagoda shape. The bark is very distinctive, with smooth green vertical stripes interspersed with corky areas.

Flowers and Fruits

Large showy flowers (9 by 8 cm) are produced from January to March, when the tree is leafless. These flowers look like large shaving brushes or powder puffs, with dense, white stamens above short, leathery petals. From February through April, oblong, green- and brown-striped fruits (18 by 8 cm) hang from the tree. When mature, the fruits split open and release small seeds embedded in grey fluff. These features are shown in figure 20.

Abundance and Habitat

This tree is common in disturbed areas, and especially in young dry forests.

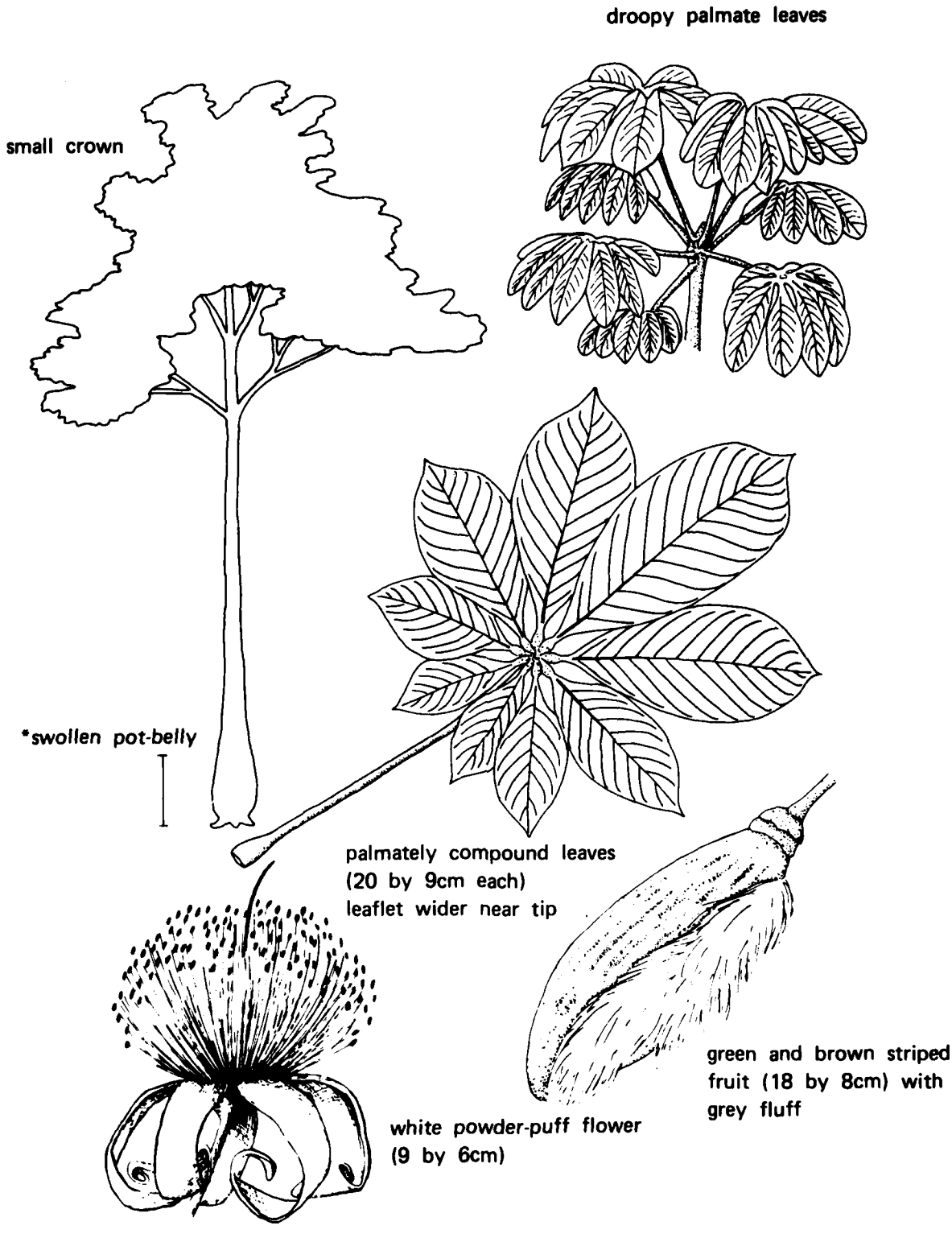

Figure 20. *Pseudobombax septenatum.*

Leaves

The leaves are alternate and pinnately compound with five to nine pointed leaflets (20 by 8 cm). The opposite leaflets, with one at the end, are attached to the main leaf stalk by slender stalks (4 cm), which are swollen at both ends. The leaflets are held out almost horizontally, with the end leaflet hanging below the others.

Tree Shape and Trunk

Protium panamense is an understory tree, 10 to 12 meters tall, which often has stilt roots at the base. Protium tennuifolium is a taller tree (18 m). The thin, smooth bark has small, raised white dots. When cut, the bark has a sweet turpentine smell.

Flowers and Fruits

The small (3 mm), yellow flowers, which bloom from January through August, are borne on spikes along the branches. From February through October, red fleshy capsules (3 cm) appear in clusters. When mature, these capsules open, and a seed with a white, jell-like covering hangs down. These features are shown in figure 21.

Abundance and Habitat

Protium tennuifolium is frequent to common in mature moist forests; Protium panamense is frequent in young, moist forests.

Similar Species

There are two common species of Protium. Protium tennuifolium is a larger tree, and the tops of the leaves are shiny. Protium panamense is an understory tree, often having stilt roots. The tops of the leaves are a dull matte green.

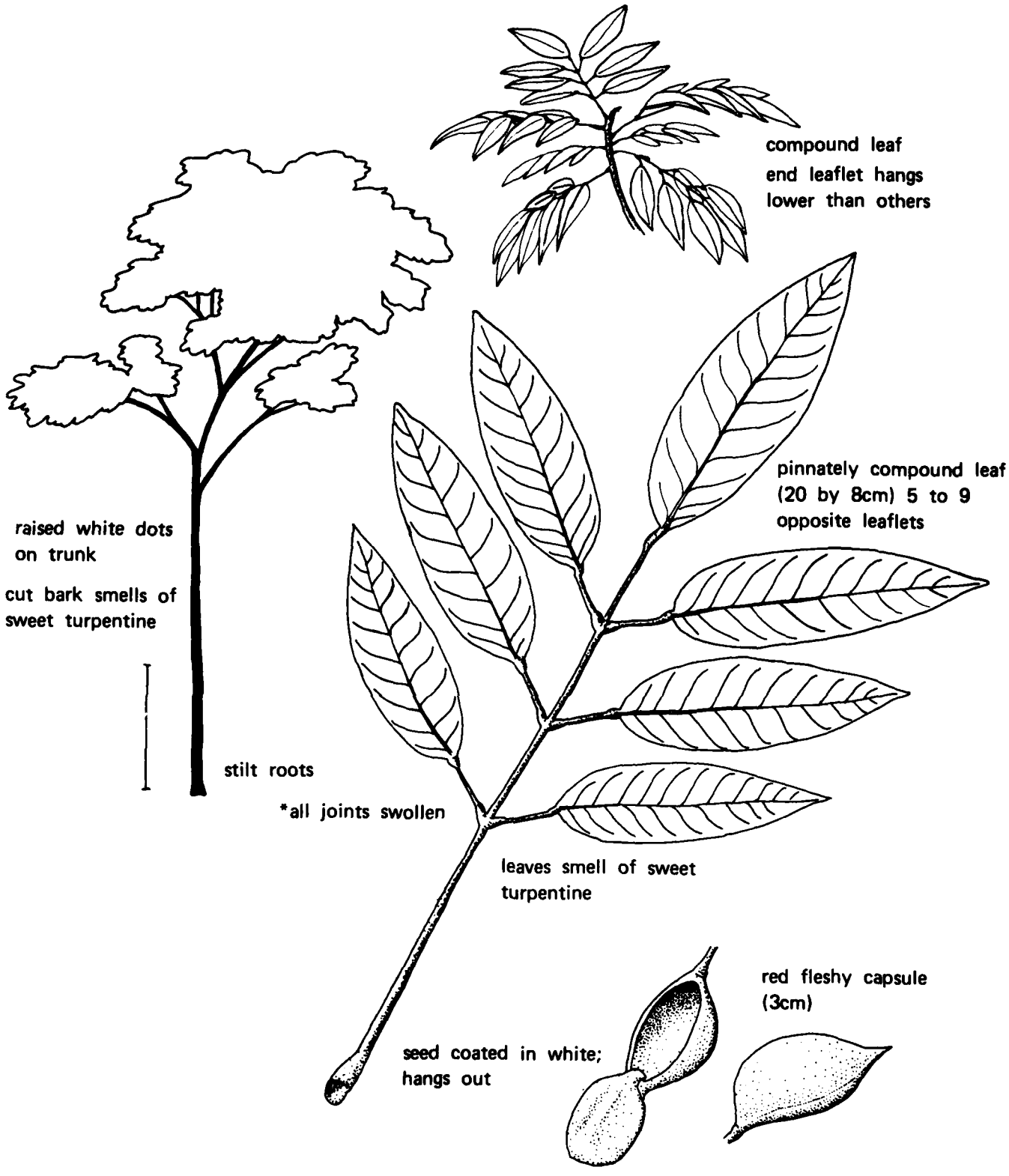

Figure 21. *Protium* species.

Annona spraguei — Cherimoya — Annonaceae

Leaves

The leaves are simple, alternate, long, flexible, and large (20 by 8 cm), with pointed tips. The top side of the leaves is dark green, while the underside is light and covered with light hairs. The light hairs also are found on small twigs. The midrib of the leaf is prominent, with parallel and evenly-spaced secondary veins, and the leaf stalks are short and thick. The leaves fall in the middle of the dry season.

Tree Shape and Trunk

The tree is about 15 meters tall, and has long, drooping side branches which often rise at right angles to each other. The center trunk is not strongly dominant, especially in young trees. The bark has shallow grooves, but is not very distinctive.

Flowers and Fruits

From February to June, single flowers (3 cm) with thick, hairy, yellow petals appear along the branches. The fruits, found from June through October, are green, fleshy (6 cm in diameter), and covered with curved, fleshy spines. Inside the fruits are many seeds. These features are shown in figure 22.

Abundance and Habitat

This tree is common in dry and moist forests, particularly in sunny locations and secondary forests.

Similar Species

In Zuelania, the leaves are held more horizontally and have unevenly-lobed leaf bases. The trunk of Zuelania is strongly vertical, with bottle-brush branches. The surface of its trunk is distinctly warty.

Apeiba is similar in tree shape and leaf size, but has a longer, thinner leaf stalk, differently shaped leaves, and more yellow-green leaves, as opposed to the grey-green leaves of Annona.

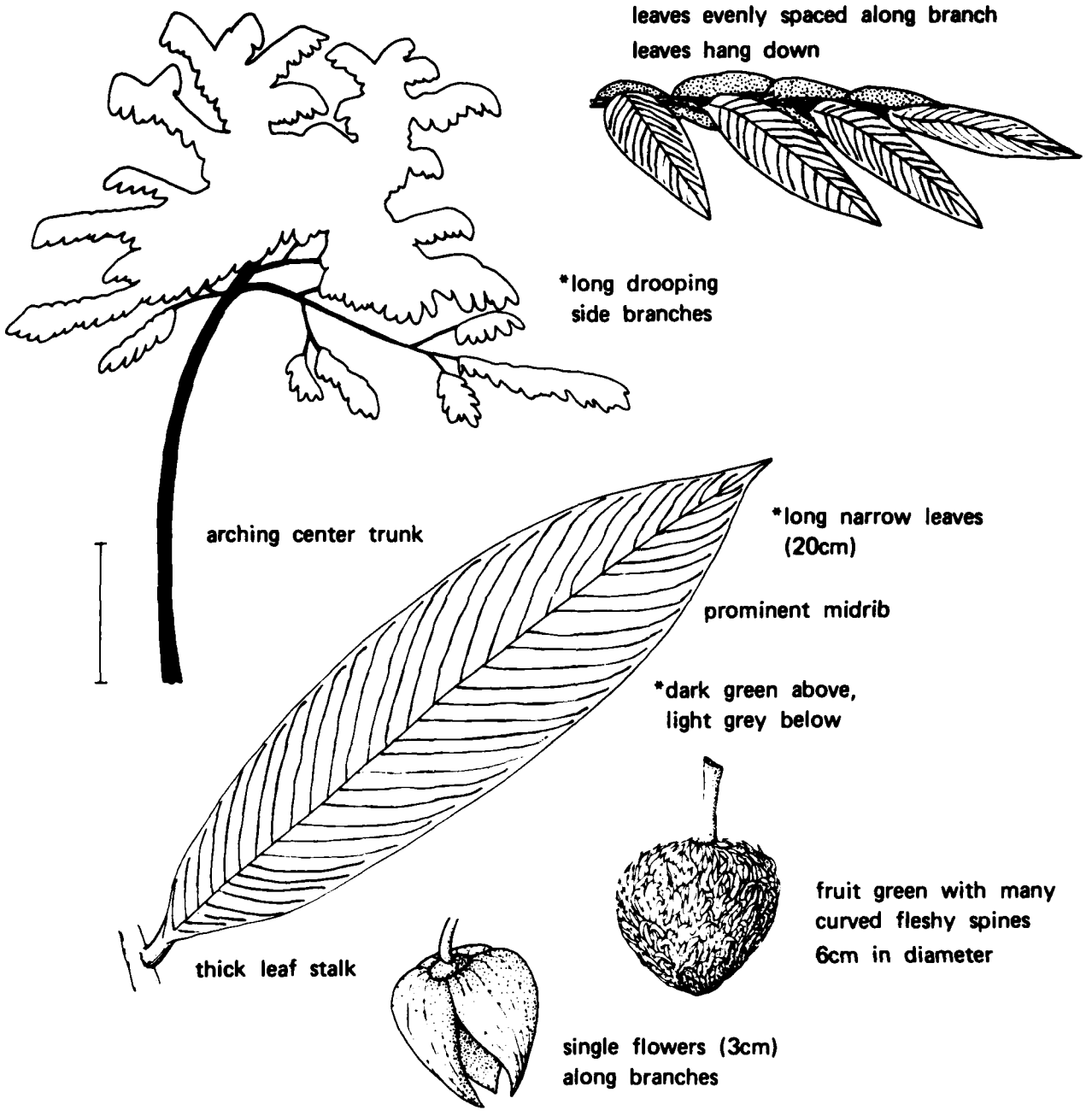

Figure 22. *Annona spraguei.*

Croton panamensis — Sangrillo — Euphorbiaceae

Leaves

The leaves are simple, alternate, and heart-shaped (18 by 15 cm), with one to three points and very long leaf stalks (20 cm). Main veins meet at the leaf base. There are groups of orange button glands on the top and bottom of each leaf near the base.

Tree Shape and Trunk

The whitish-colored trunk is slender, with leaves near the branch ends giving a flat-topped appearance. Maximum tree height is 20 meters. When the bark is cut, the sap turns red.

Flowers and Fruits

White flowers (7 mm) bloom on long, curved spikes (30 cm) at the branch ends, and can be seen sticking out above the leaves. Normally, the flowers bloom in July and December, but sometimes they bloom year-round. The fruits appear in September and May. They are small, round, rough (grooved) capsules (7 mm), with a projection at the tip. Brown seeds (3 mm) fill the yellow-brown capsule. These features are shown in figure 23.

Abundance and Habitat

This tree generally grows in dense patches, and is found frequently in disturbed, moist forests.

Similar Species

Croton bilbergianus has similarly sized and shaped leaves, but the leaf stalk is much shorter (6 cm), and the button glands are only on the leaf underside.

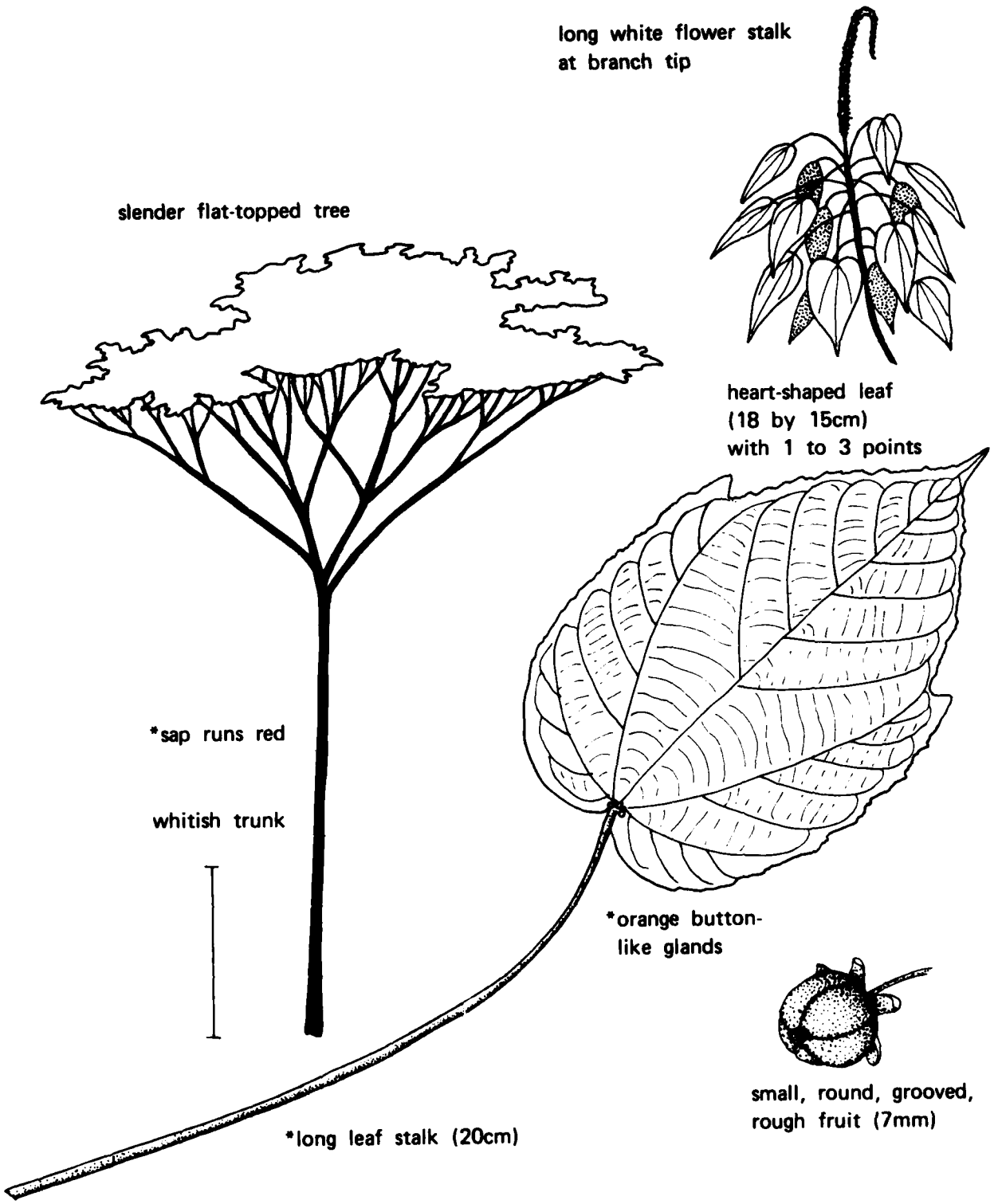

Figure 23. *Croton panamensis.*

Apeiba tibourbou — Monkey Comb — Tiliaceae

Leaves

The leaves are simple, alternate, and large (20 by 7 cm), with pointed tips and heart-shaped bases. The leaves are flexible, light green, and very droopy. The leaf blades are widest near the tip, toothed, and hairy. The leaf stalks (2 cm) are swollen at both ends and covered with hairs. The main leaf veins (three to seven) meet at the leaf base, with the secondary veins running perpendicular (ladder venation). The trees are leafless during the dry season.

Tree Shape and Trunk

The trunk is curved in older trees, and markedly drooping in younger trees. Branches also are long and drooping. The bark is thin and smooth with many small bumps. Average tree height is 18 meters.

Flowers and Fruits

Yellow flowers (4 cm) bloom in clusters along the branches from May to December, although some flowers may be present all year. The outside and the base of the flowers are very hairy. From February to April, round capsules (8 cm), densely covered with bristles, appear. Inside the capsule are many small (2 mm) seeds. The fruits look like round, spiny sea urchins; they are very noticeable, both on the ground and in the tree when it is leafless during the dry season. These features are shown in figure 24.

Abundance and Habitat

This tree is common in disturbed areas and young forests of both dry and moist areas.

Similar Species

Apeiba membranacea has a similar tree shape, but its leaves are not as hairy. Its fruits also look like sea urchins, but are flat on the top and bottom, and have fewer, shorter spines.

Luehea is similar from a distance, but its leaves are smaller, and not as droopy, with a dark green top and a rusty underside.

Annona has a similar tree shape and similar-sized leaves, but they are narrower, have thicker and shorter leaf stalks, and are more grey-green in color.

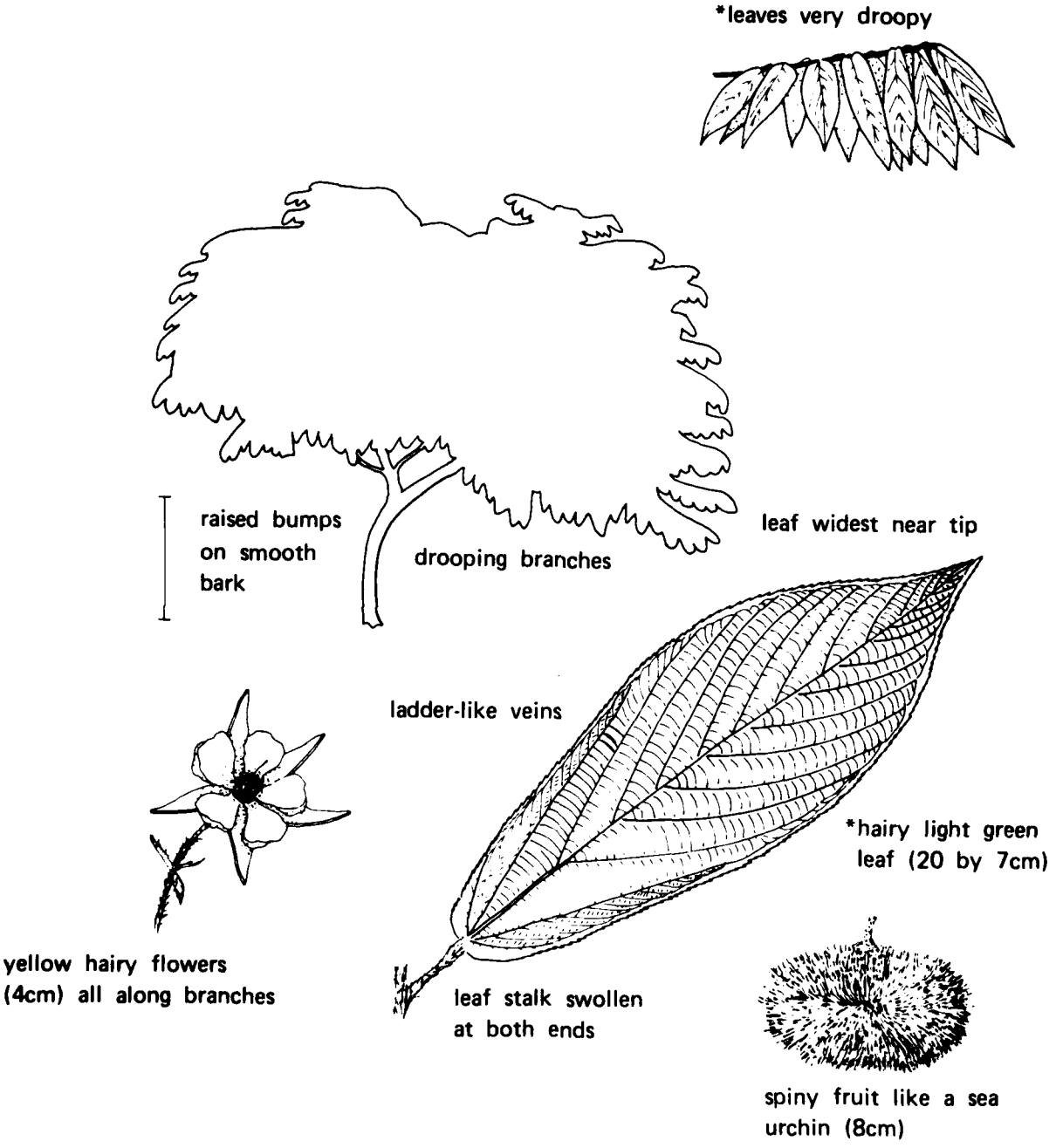

Figure 24. *Apeiba tibourbou.*

Cochlospermum vitifolia | Poro-poro | Cochlospermaceae

Leaves

The leaves (16 cm) are simple, alternate, star-shaped (generally having five points), and have toothed edges. Leaf tips often point down. Leaf stalks are long (25 cm) and thin. Leaves fall throughout the dry season.

Tree Shape and Trunk

This tree is generally about 8 meters tall. It has a thin trunk and thin, sparse, spreading branches with leaves near the tips. The wood is soft and the bark is thin, minutely fissured or striped, and sometimes peeling.

Flowers and Fruits

From December to April, when the tree is leafless, large (10 cm), bright showy yellow flowers blossom with five spreading petals. From February through April, large, round, woody capsules split into five parts and release many small seeds (4 mm) embedded in cotton fluff. These features are shown in figure 25.

Abundance and Habitat

These trees are common in open and recently disturbed sites of both wet and dry areas. This tree requires abundant sunlight and is characteristic of very early second growth.

Similar Species

Cecropias are somewhat similar and often are found in the same habitats. The Cecropias are larger, have more rounded leaf tips, and the leaf stem attaches to the center of the leaf blade, not at the edge as in Cochlospermum.

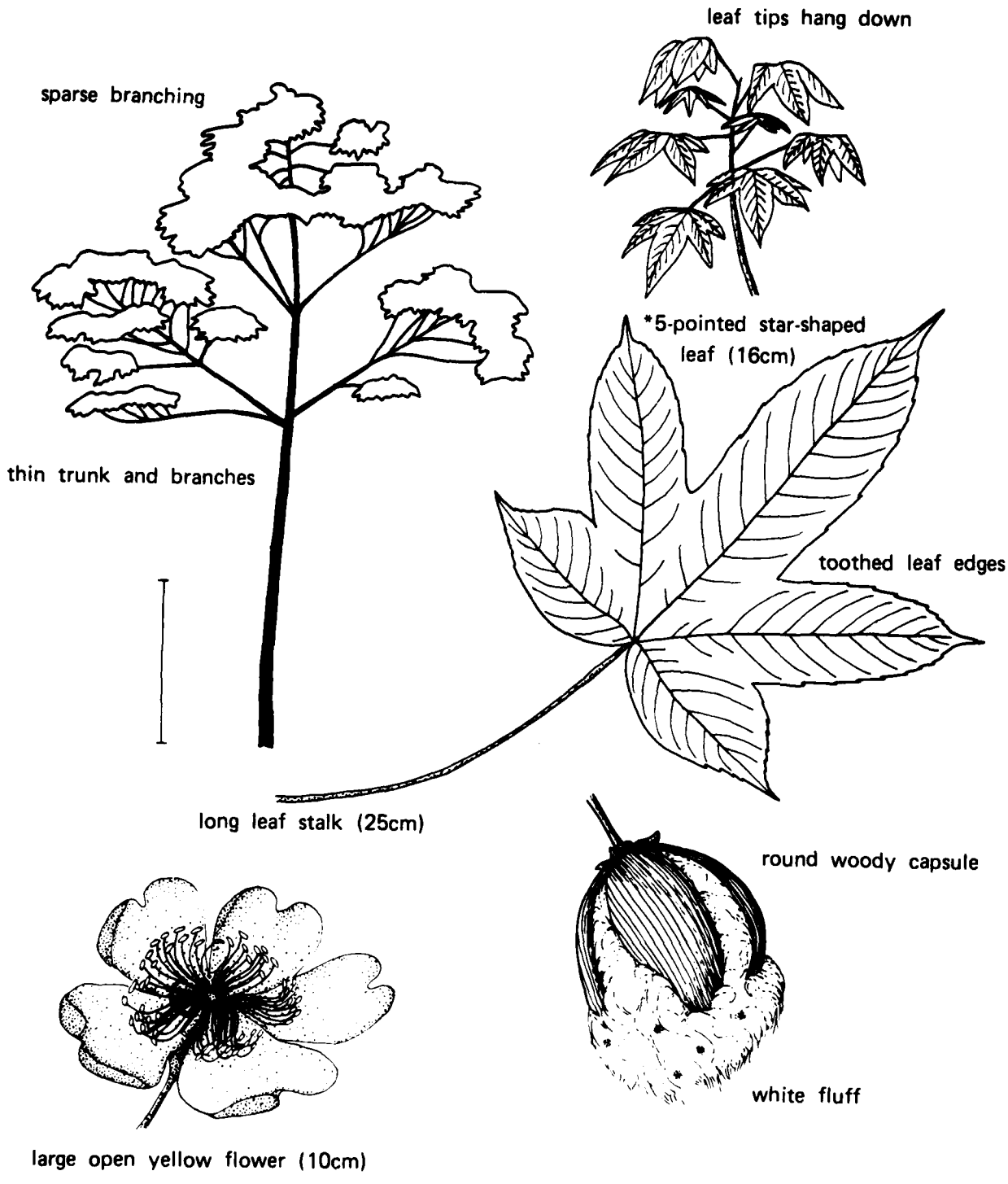

Figure 25. *Cochlospermum vitifolia.*

Sapium caudatum — Olivo — Euphorbiaceae

Leaves

The leaves are simple (15 by 4 cm), alternate, and tough, with finely toothed edges (this last characteristic is not very visible from the ground). There is a prominent white midrib, but the other veins are not obvious from a distance. The leaves are folded slightly along the midrib, and the edges curl up. There are two protruding glands near the base of each leaf blade. Leaves fall during the dry season.

Tree Shape and Trunk

The branches are straight and often vertical. The tree grows to 30 meters in height. If the tree has buttresses, they are small and close to the ground. The bark is light-colored, with grooves making it look like alligator skin. The cut bark and leaves yield copious milky sap.

Flowers and Fruits

From May to July, many small lavender flowers bloom on a single spike arising from the branch tips. From July through December, capsules (1 cm) are appear on a spike split into three segments, each with a seed (6 mm) coated in red pulp. These features are shown in figure 26.

Abundance and Habitat

This tree is frequent in moist, young and mature forests.

Similar Species

Ficus is very similar from a distance, but the secondary veins of Ficus are visible from the ground. The leaves of Ficus are broader in relation to their length, and the leaf edges are not folded up. The bark of Ficus is smoother and the branches are not so straight and angular.

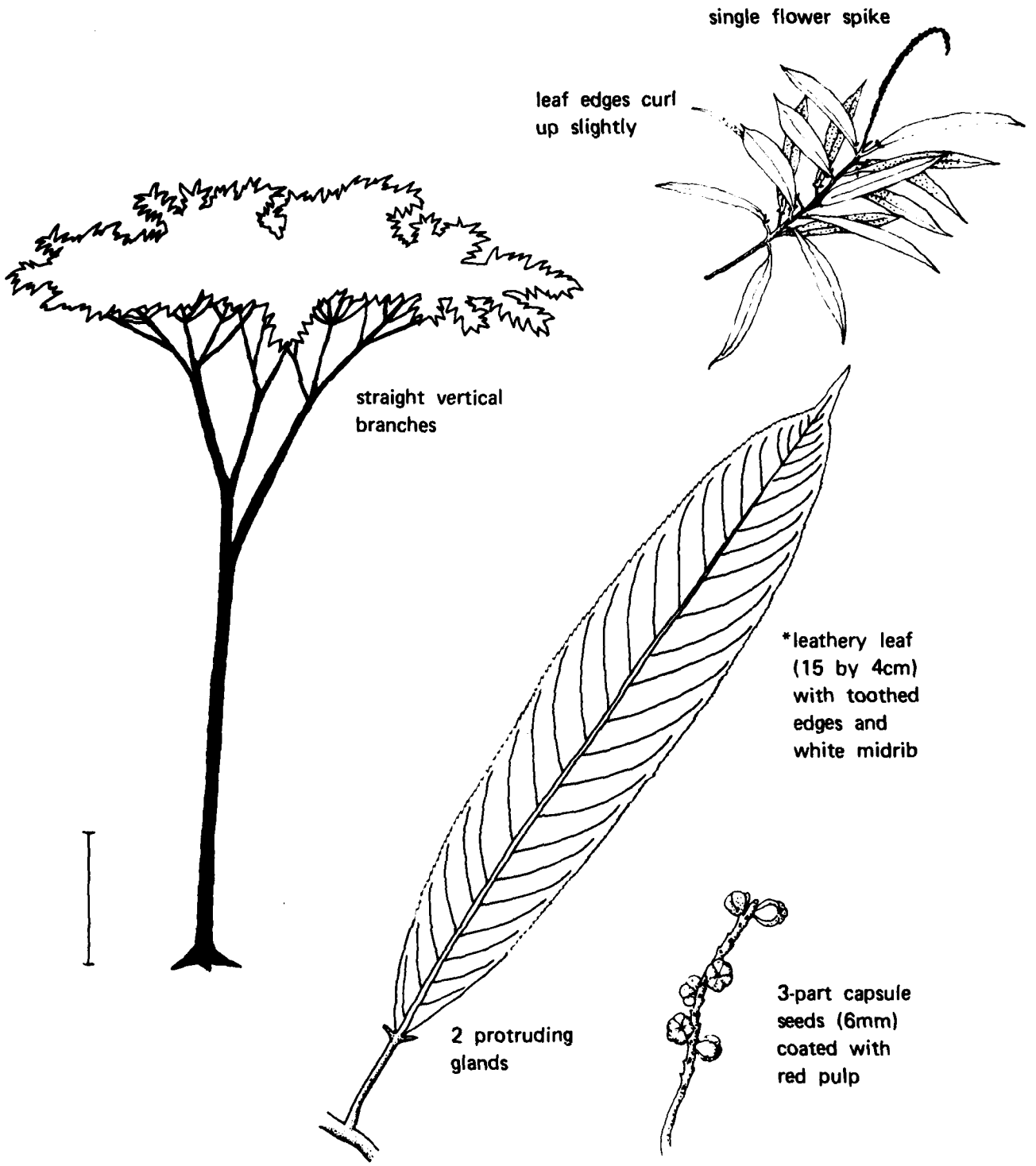

Figure 26. *Sapium caudatum.*

Ficus insipida — Wild Fig — Moraceae

Leaves

The leaves are simple (15 by 7 cm), alternate, and tough. The unexpanded young leaf at each branch tip is rolled into a distinct sheath. The midrib and secondary veins are white and can be seen from the ground.

Tree Shape and Trunk

The tree (35 m) has a broad, graceful crown. The foliage is spread in a thin layer near the periphery, giving a very flat-topped appearance. The tree often has large buttresses which curve gracefully from the trunk, and taper into large roots running overland for a long distance. The bark is smooth and very light. Cut bark and leaves yield copious milky sap.

Flowers and Fruits

Individual trees are found with figs year-round, though a given tree will drop all its figs within a short time. Flowers grow on the inside of the fig, so flowers and fruits look essentially the same. The figs are round (4 cm), fleshy, and yellow-green with light spots. They are borne singly all along the branches. These features are shown in figure 27.

Abundance and Habitat

This tree generally is widespread, but common in moist, secondary forests.

Similar Species

There are several similar Ficus species, but Ficus insipida is the most common.

Sapium caudatum looks similar from a distance but the Sapium leaves are narrower, with two glands at the leaf base, leaf edges that curl slightly up, more conspicuous secondary veins, no prominent pointed sheath at the branch tip, a narrower more angular crown, and rough alligator-skin bark.

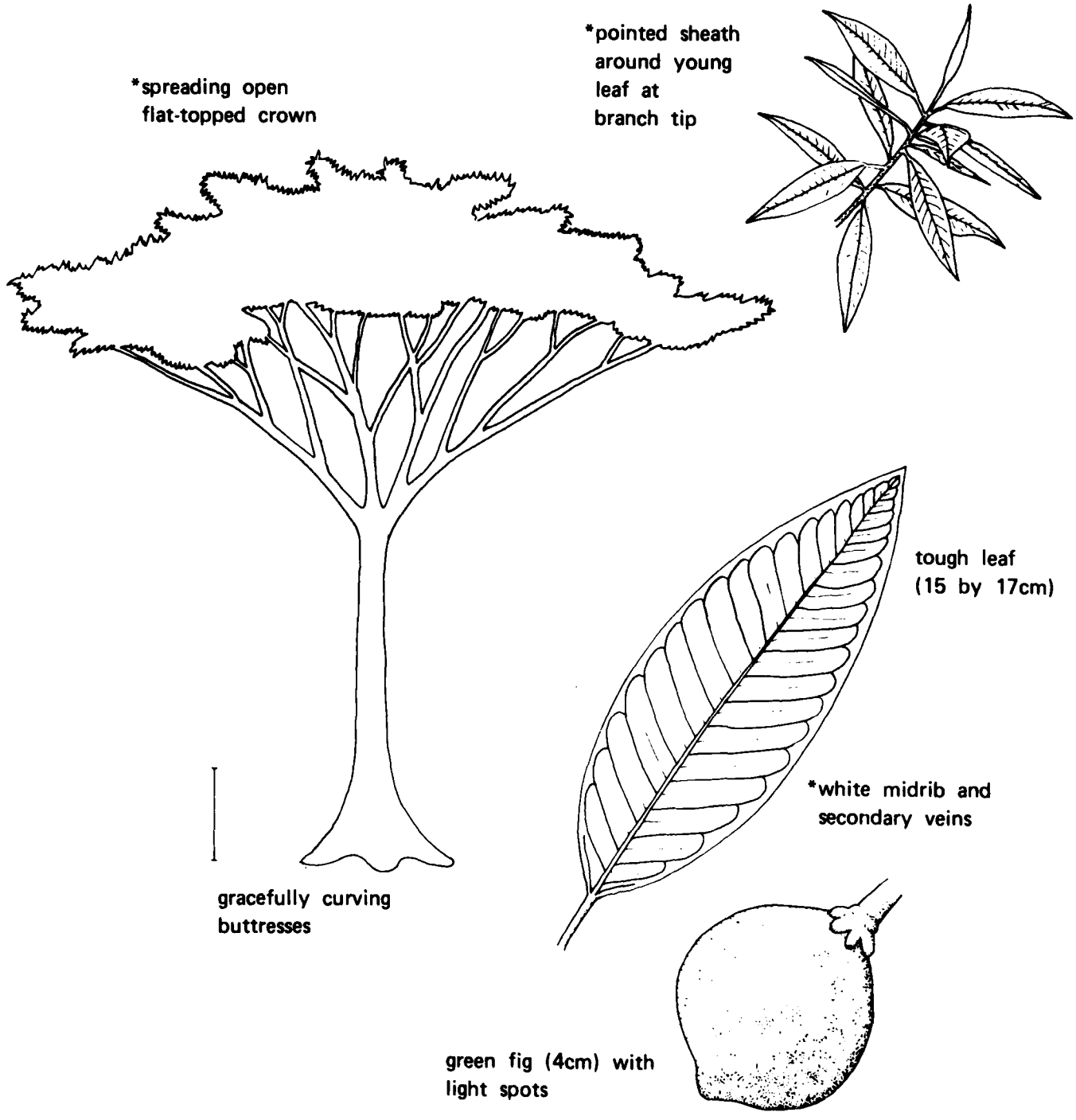

Figure 27. *Ficus insipida.*

Faramea occidentalis — Bonewood — Rubiaceae

Leaves

The dark green leaves (15 by 6 cm) are simple, opposite, stiff, glossy, and pointed at both ends. Between each pair of leaves, and at the branch tips, there are two white or light tan triangular stipules (1.5 cm); at the branch tips, the points of the stipules are crossed like swords. Because this is a small understory tree with branches at eye level, the leaves are easy to see.

Tree Shape and Trunk

This is a small (10 m) understory tree or shrub, with a straight center trunk. The main branches, as well as the smaller ones, divide in pairs. The bark is grey and fairly smooth, but not distinctive.

Flowers and Fruits

From March through July, the long (3 cm), tubular, white flowers, with four pointed lobes and a strong sweet smell, bloom. The flowers, which open at night, probably are pollinated by moths. From April through December, round, fleshy fruits (2 cm), with a raised ring at the tip, appear. They are pale gree when young, and turn blue-black after maturing late in the year. These features are shown in figure 28.

Abundance and Habitat

This tree is common in mature, moist forests.

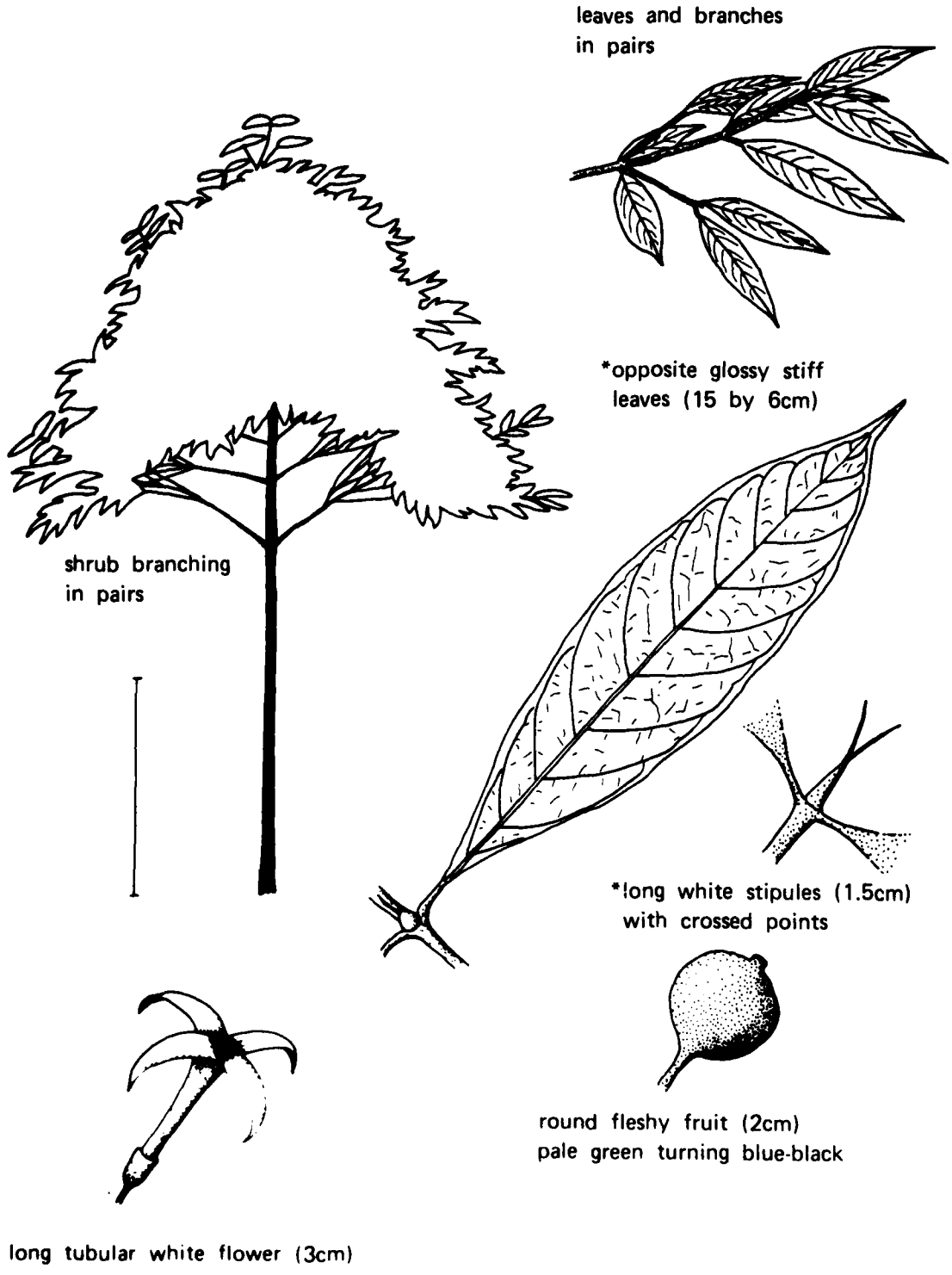

Figure 28. *Faramea occidentalis.*

Zuelania quidonia Cagajon Flacourtiaceae

Leaves

The leaves (15 by 5 cm) are simple, alternate, and elliptical. They have unevenly lobed bases and slightly toothed margins. Small translucent dots can be seen on the leaves if they are held against light. The midrib and secondary veins are prominent. There are hairs on the leaves of young twigs. Leaves are held horizontally in a plane with the branch. Branches are dark with raised white warts. The tree loses its leaves in the dry season.

Tree Shape and Trunk

The tree can be 25 meters in height, and is shaped like a bottle brush, with whorls of long horizontal branches. The bark is light brown without grooves, but with many raised round, white warts. These warts are quite conspicuous.

Flowers and Fruits

The tree flowers when it is leafless, from February to May. Small (1 cm), white-yellow flowers are grouped in balls (4 to 5 cm diameter) near the branch tips. The fruits are round (7 cm), three sided, and very dark green. From April to June, they split open to expose an orange matrix embedded with white seeds (4 mm). These features are shown in figure 29.

Abundance and Habitat

Occasionally, this tree is found in both dry and wet forests.

Similar Species

Annona has leaves with equal leaf bases, but which droop more from the branches. In Annona, the trunk leans and the branches droop.

Virola also is shaped like a bottle brush and the leaves are about the same size, but Virola has a much darker trunk without the white warts.

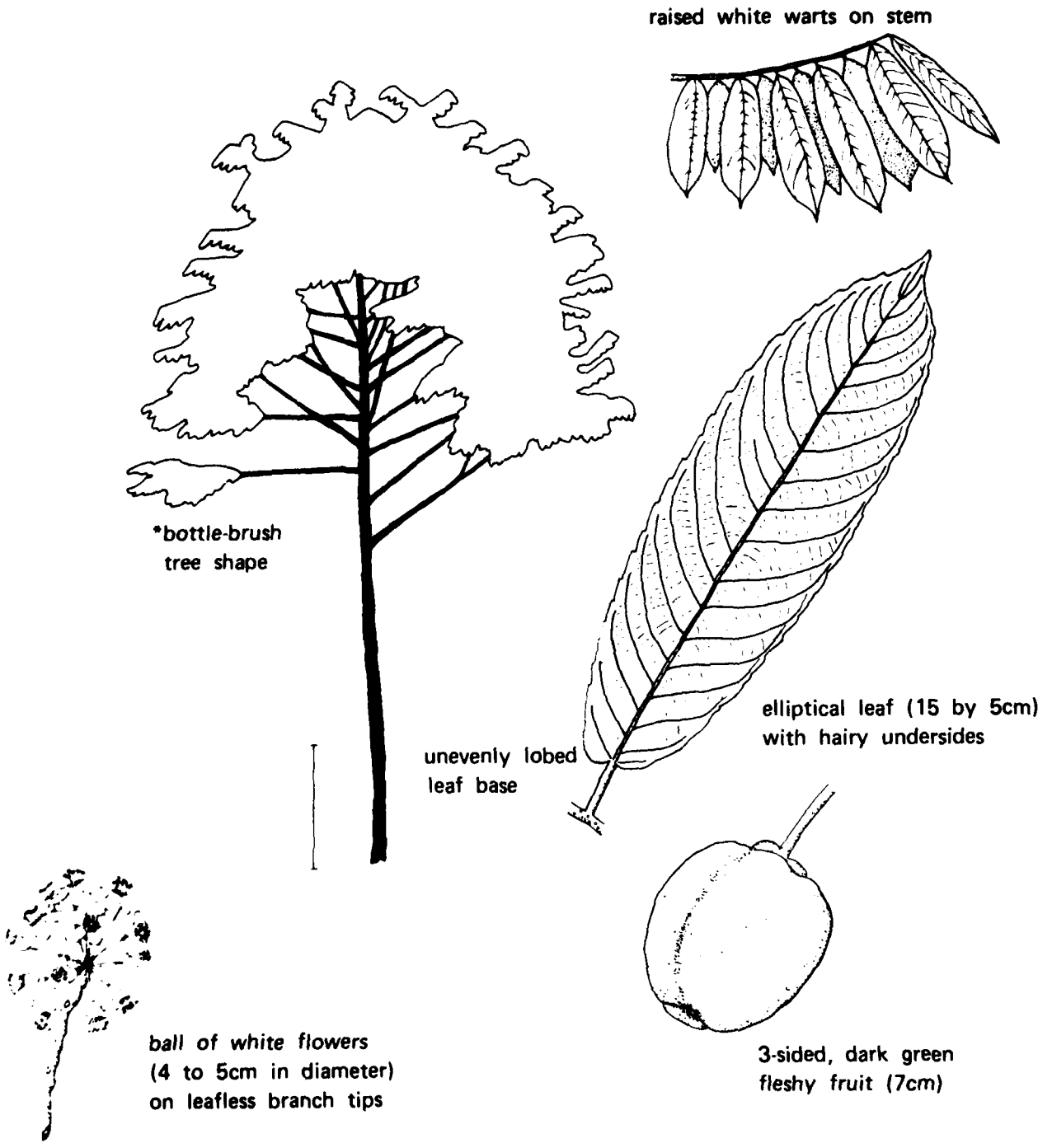

Figure 29. *Zuelania quidonia.*

Luehea seemannii — Guacimo — Tiliaceae

Leaves

The leaves (16 by 7 cm) are simple, alternate, and somewhat rectangular in shape, with toothed edges and asymmetrical leaf bases. Three major veins meet at the leaf base; the secondary veins are perpendicular to the major veins, creating a ladder pattern. The top of the leaf is a dark green, but the most distinctive aspect is the golden-brown undersides of the leaves. The leaves fall slowly during the dry season and reappear in May.

Tree Shape and Trunk

The main branches tend to be vertical rather than spreading. Tree height is about 25 meters. The outer bark is thin with raised white, warty bumps. On younger trees and upper branches, the bumps are often in vertical rows. Older trees are buttressed.

Flowers and Fruits

From November through January, medium-size flowers (2.5 cm), with five yellow petals and greenish, hairy, petal-like scales below, bloom. From March to July, dry woody capsules (2.5 cm), with five deep grooves, split open at maturity to release many papery wind-blown seeds. These features are shown in figure 30.

Abundance and Habitat

This tree is very common in young forests, both wet and dry. It grows in mature forests, but needs a sunny gap in the forest to mature.

Similar Species

Luehea speciosa is similar except that the leaf undersides are whitish, not golden-brown, and the leaf edges are more coarsely toothed.

Apeiba tibourbou is somewhat similar from a distance, but its leaves are lighter green, longer, and droop more.

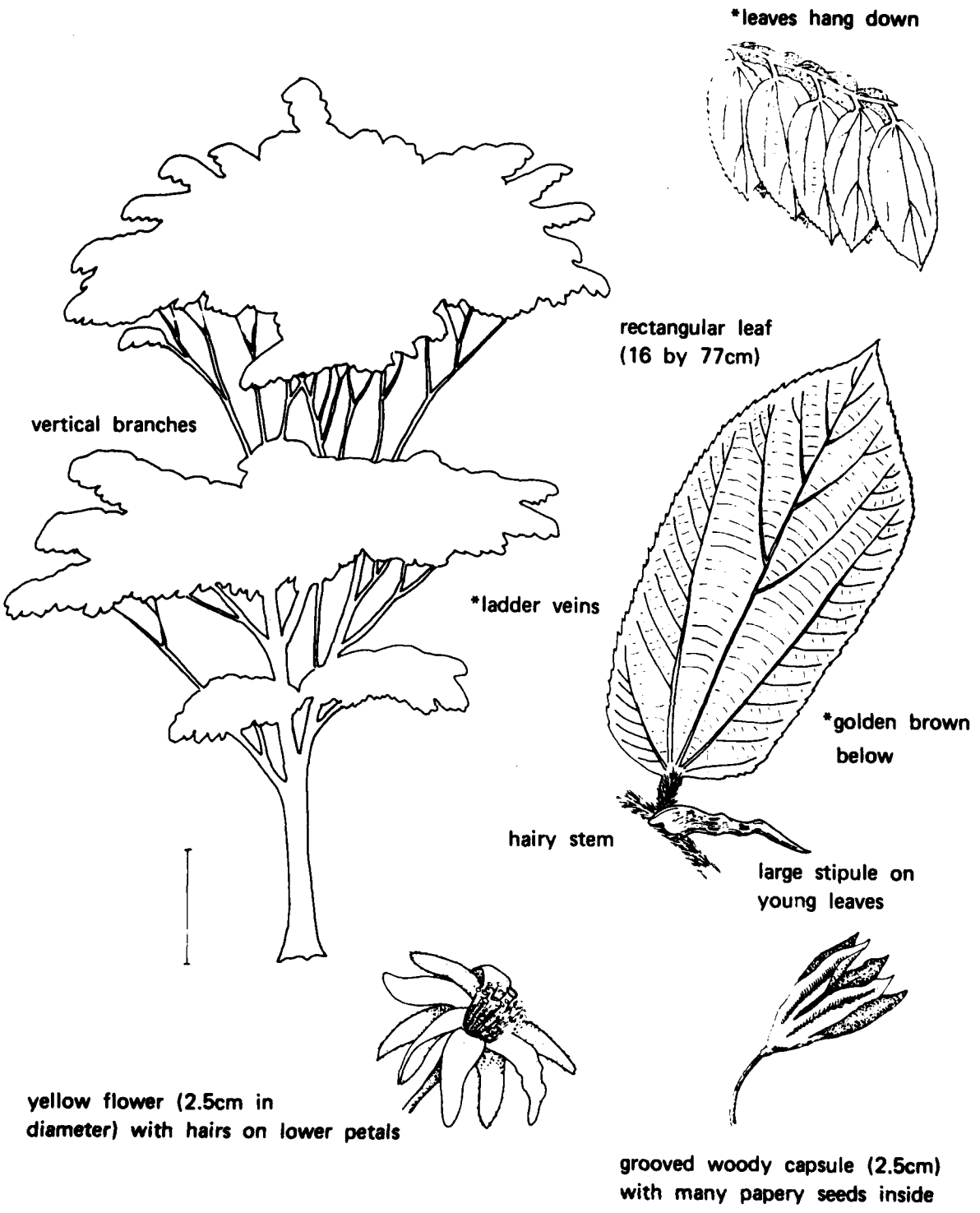

Figure 30. *Luehea seemannii.*

Trichospermum mexicanum — Tiliaceae

Leaves

The leaves (17 by 5 cm) are simple, alternate, long, and narrow, with toothed edges. Leaf stalks are 2 centimeters long and swollen at both ends. There are three main veins which meet at the leaf base and run parallel to each other almost to the leaf tip. The secondary veins form a ladder pattern. The leaves are crowded at the ends of very small branches, and point toward the branch tips. Young twigs and leaf stems are covered with hairs.

Tree Shape and Trunk

This is a slender tree (15 m) with candelabra-type branching. Many sprays of small branches leave the ends of larger ones. The bark is smooth and grey.

Flowers and Fruits

From November through January, clusters of pink flowers (3 cm) bloom on branched spikes along the stems. From February to April, fruits hang on branched spikes along the stems. The brown, heart-shaped, woody capsules (2.5 cm) split in half to dispense many small (2.5 mm), flat seeds with bristles along their edges. These features are shown in figure 31.

Abundance and Habitat

This tree is found frequently in young, moist forests.

Similar Species

The leaves of Trema are very similar, but Trema has uneven lobes at the leaf bases. A more distinctive difference is that Trema has long, straight branches and Trichospermum has sprays of short ones.

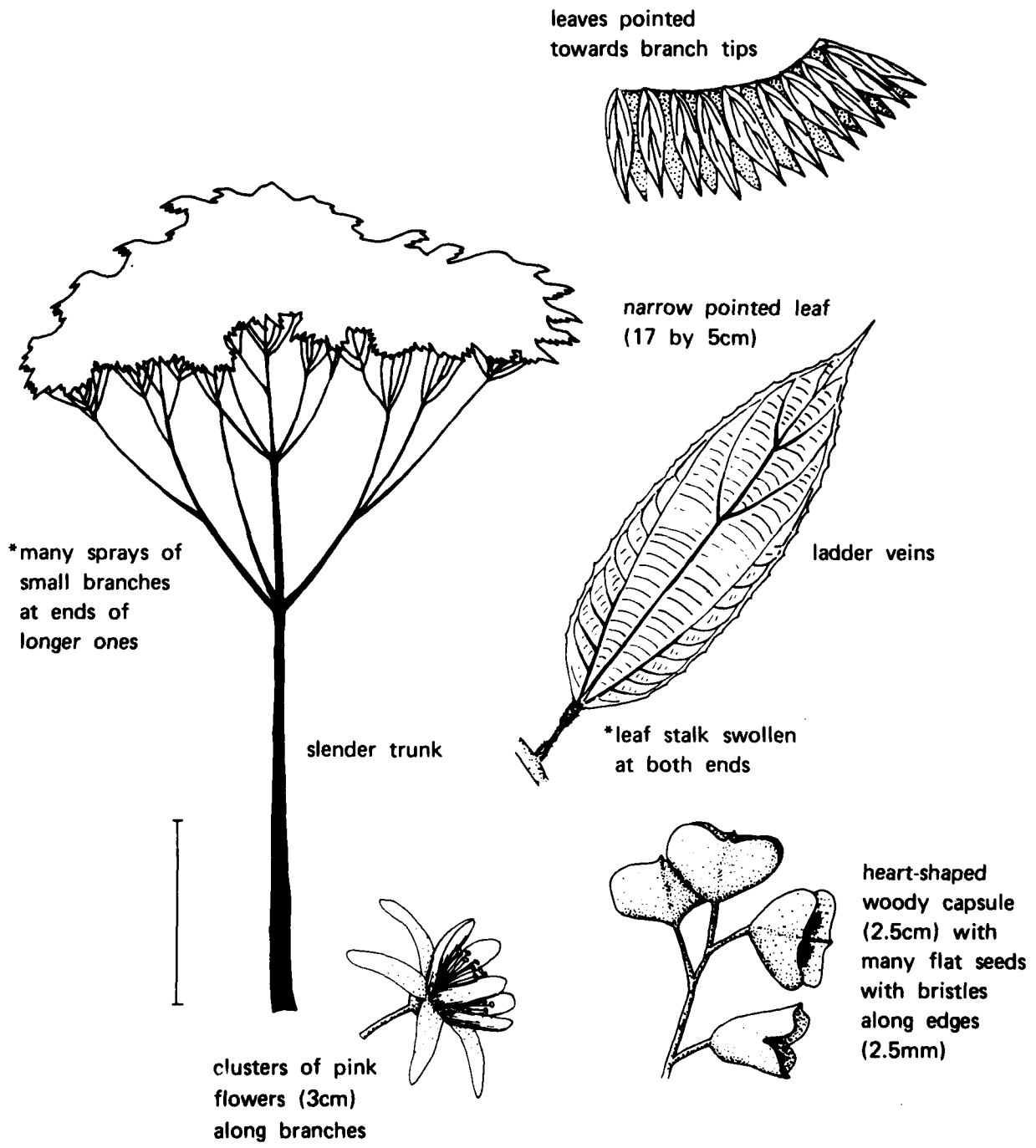

Figure 31. *Trichospermum mexicanum.*

Leaves

The leaves are alternate and palmately compound, with five to nine narrow, pointed leaflets (each 15 by 3 cm). Sometimes, the leaflet tips are toothed. The leaflets are attached directly to the leaf stalk (15 cm long), and often droop. Leaves are lost at the end of the rainy season and are replaced at the beginning of the next rainy season.

Tree Shape and Trunk

This is a large tree (40 m) often rising above the rest of the canopy. The trunk is massive, with extremely large, wedge-shaped, curving buttresses, especially on old trees. Thick, horizontal branches come out near the top of the tree. The crown can be very broad if the tree is growing in an open area. The bark is grey and rough, with vertical grooves. Very young trees have spines.

Flowers and Fruits

From January through March, when trees are leafless, flowers (4 cm) bloom in clusters at the branch tips. They are bell-shaped cups with yellow petals. From January through March, elliptical, greenish fruits (18 by 4 cm) split open to expose grey fluff (kapok) and many small rounded seeds. These features are shown in figure 32.

Abundance and Habitat

Occasionally, this tree is found in both wet and dry forests.

Similar Species

From a long distance, Ceiba may look similar to Cavanillesia platinifolia because they are both emergents with grey bark; however, Ceiba has rougher bark with grooves, large buttresses, and a larger more spreading crown.

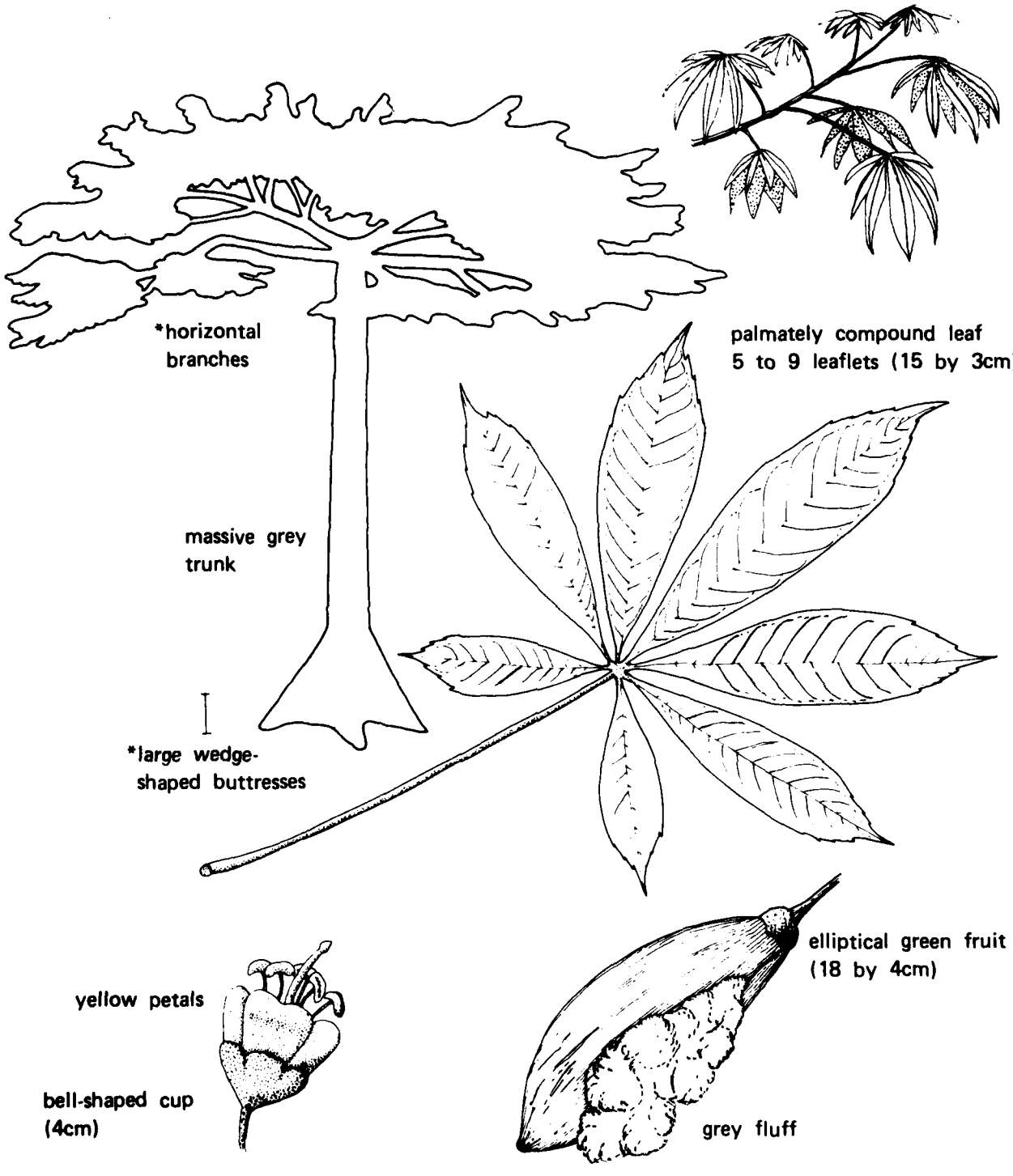

Figure 32. *Ceiba pentandra.*

Tabebuia rosea — Roble blanco, Pink Poui — Bignoniaceae

Leaves

The leaves are opposite and palmately compound, with three to five leaflets (14 by 6 cm) which droop. Leaflet stalks are about 5 centimeters long, and the main leaf stalk is about 10 centimeters long. Leaves are shed in the dry season, and sometimes in July.

Tree Shape and Trunk

The trunk is straight; the branches are horizontal and spreading. Tree height is about 35 meters. The thick bark is light grey with a yellowish tinge; deep fissures or grooves run vertically.

Flowers and Fruits

During March and April, large, light pink flowers (7 cm), with a long tube and ruffled petals, bloom. An individual tree can be completely covered with showy flowers for several weeks during the time it is leafless. Year-round, long brown pods (30 cm) are present. These pods split open to release many small papery seeds (1 cm) in the early wet season. These features are shown in figure 33.

Abundance and Habitat

Occasionally, this tree is found in mature and young forests of both wet and dry areas.

Similar Species

Tabebuia guayacan also is a common tree and has similar shaped leaves; only T. guayacan tends to have seven instead of five leaflets. It has masses of yellow flowers, not pink, in the dry season.

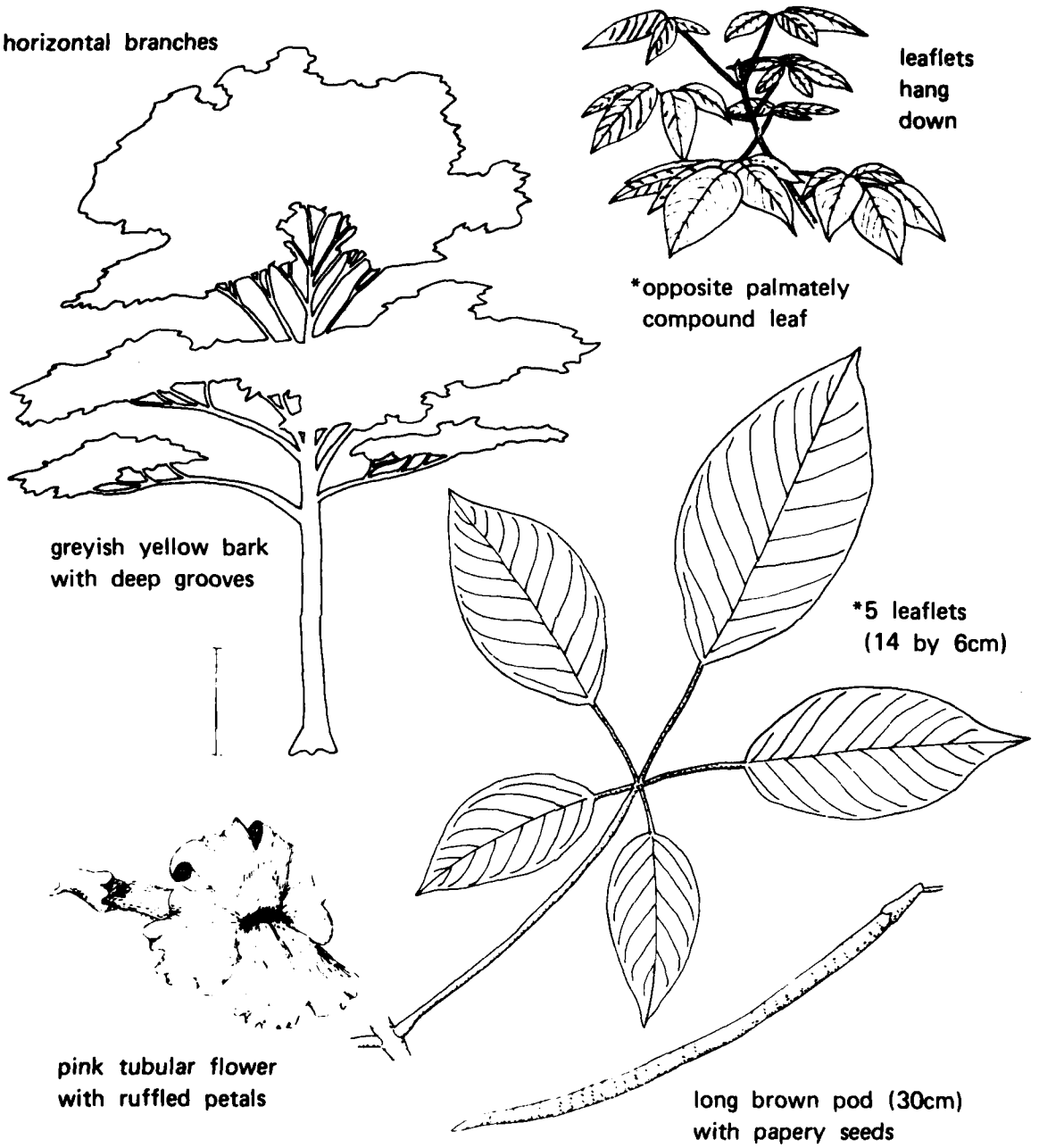

Figure 33. *Tabebuia rosea.*

Erythrina fusca | Gallito | Papilionoideae

Leaves

The leaves are alternate and pinnately compound, with three leaflets. The terminal leaflet is the largest (14 by 9 cm); the other two are smaller. The dark green leaflets, with grey-green undersides, are rounded at both ends. The leaflet stalks are very thick and round. The main leaf stalk often has thorn-like bumps. The leaves are clustered, and the leaflets are held with their tips up. Leaves fall and reappear in March.

Tree Shape and Trunk

This tree is approximately 20 meters tall, with a thick center trunk that has large branches near the ground. The leaves grow in dense clumps. The bark is rough and grey, with broad corky spines.

Flowers and Fruits

From November through March, groups of large (5 cm) orange flowers hang in tiers, with one large petal drooping down on each flower. During April and May, long pods (19 cm), covered with short brown hairs, appear. The pod twists and splits length-wise, shooting out several dark brown seeds (1 cm). These features are shown in figure 34.

Abundance and Habitat

Occasionally, this tree is found in swampy areas or by water.

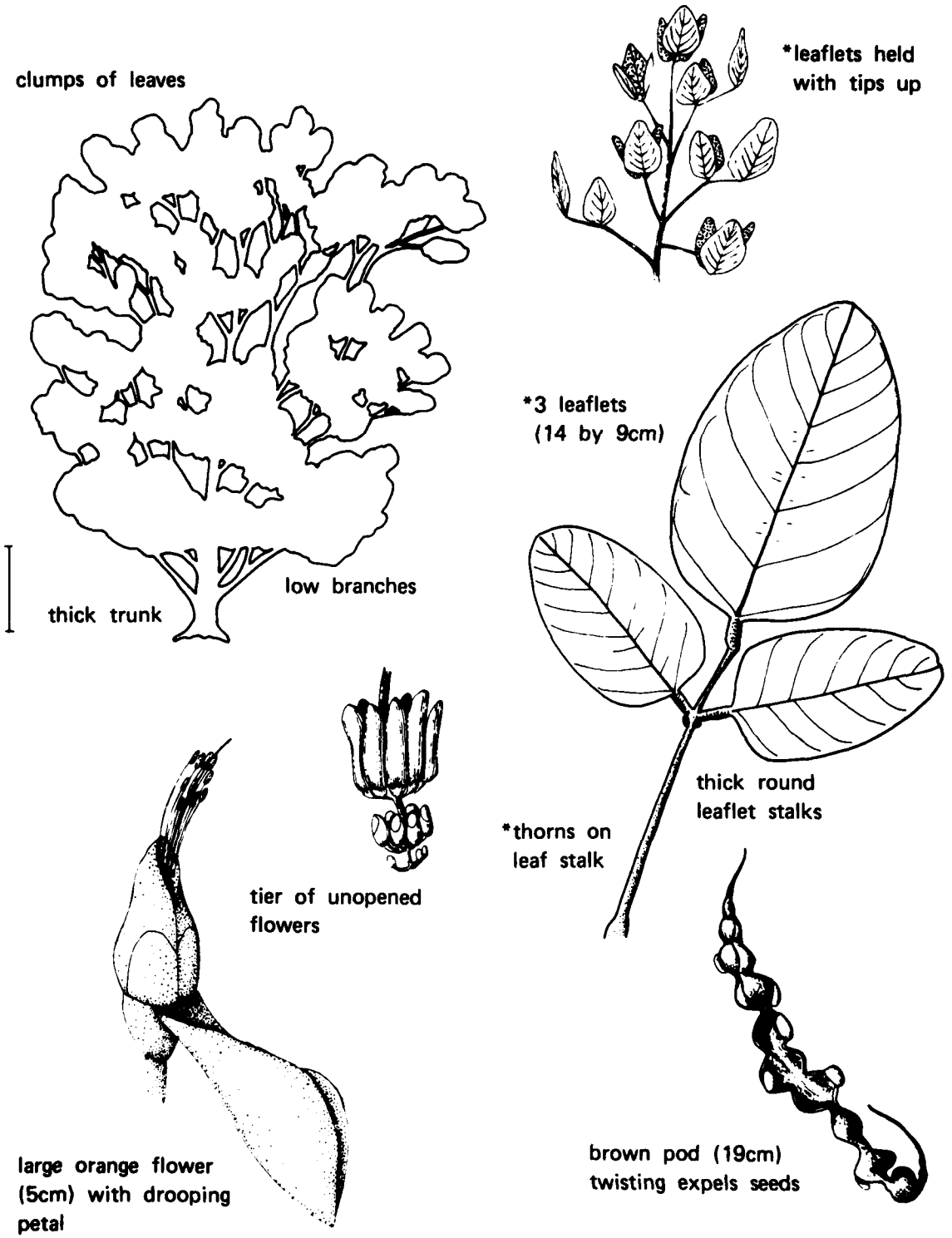

Figure 34. *Erythrina fusca.*

Heisteria concinna — Naranjillo — Olacaceae

Leaves

The leaves (14 by 7 cm) are simple, alternate, thick, and glossy on top. They are rounded at the base and pointed at the tip. All veins, except the midrib, are hard to see. The leaf stalk (1.5 cm) is very curved and swollen near the leaf base.

Tree Shape and Trunk

This tree is about 15 meters tall, with a straight, thin trunk. The tips of side branches are slender, flexible, and hang straight down. The bark is brown, thin, and bumpy, but not very distinctive.

Flowers and Fruits

Mainly in November, but sometimes in May, very small (2 mm) greenish-white flowers bloom along the stem. From January through April, white, fleshy fruits (1 cm), circled by stiff, red, lobed skirts (2 cm), appear all along the stems. These features are shown in figure 35.

Abundance and Habitat

This tree is found frequently in mature, moist forests.

Similar Species

Heisteria longipes is an understory shrub (10 meters), with less shiny leaves, and more conspicuous secondary veins on the leaf undersides. The skirt of the fruit is less deeply lobed and the fruit is black.

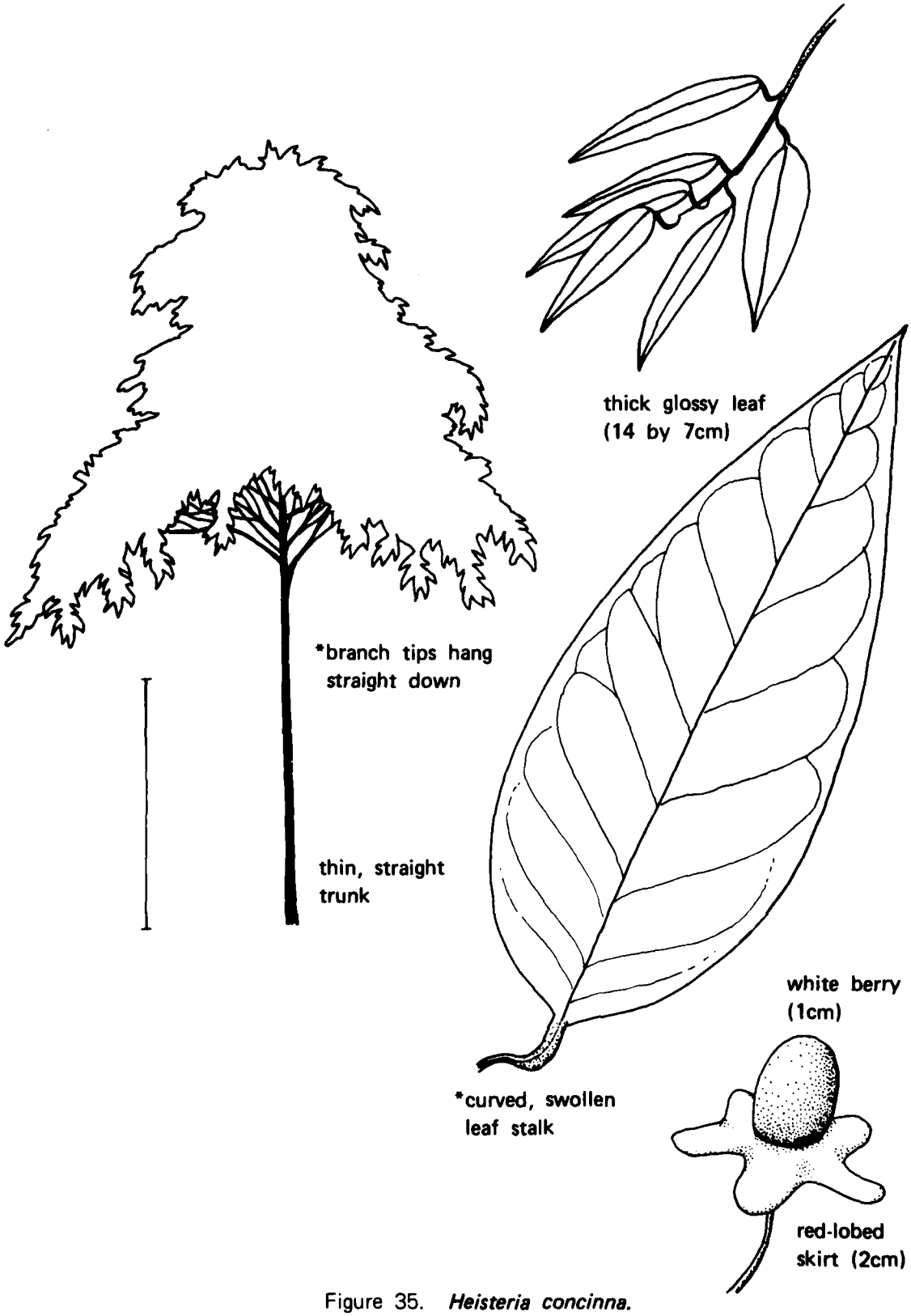

Figure 35. ***Heisteria concinna.***

Leaves

The leaves are alternate and pinnately compound, with seven to nine pairs of leaflets (12 by 4 cm) (there is no end leaflet). The leaflets have a round base, a pointed tip, and 13 to 15 pairs of raised secondary veins. Where the main leaf stalk joins the twig, there is a branched, leaf-like stipule (2 cm) which can sometimes be seen from the ground. The smaller branches have flat sides and ridges. The tree is leafless briefly in September, just before new leaves emerge.

Tree Shape and Trunk

This tree is about 30 meters tall, with thin buttresses rising several meters high. Widely spreading relay branches create a broad crown, which sometimes is as wide as the tree is tall. The smooth, reddish-brown bark has small cracks in it; faint orange and white bands circle the trunk. The top edges of the buttresses are rust-colored, and look velvety.

Flowers and Fruits

From March to July, in 4-year cycles, a number of individual trees flower once and die. The small (< 1 cm) yellow flowers bloom on branched spikes at the branch tips. The tree is leafless when in fruit, but the young green fruits look like leaves: large (13 cm), flat, and papery, with a seed in the middle. Green when young, the fruits turn light brown in February and March, and are blown off the tree. This species is unusual because it dies after fruiting once. These features are shown in figure 36.

Abundance and Habitat

Occasionally, this tree is found in mature, moist forests.

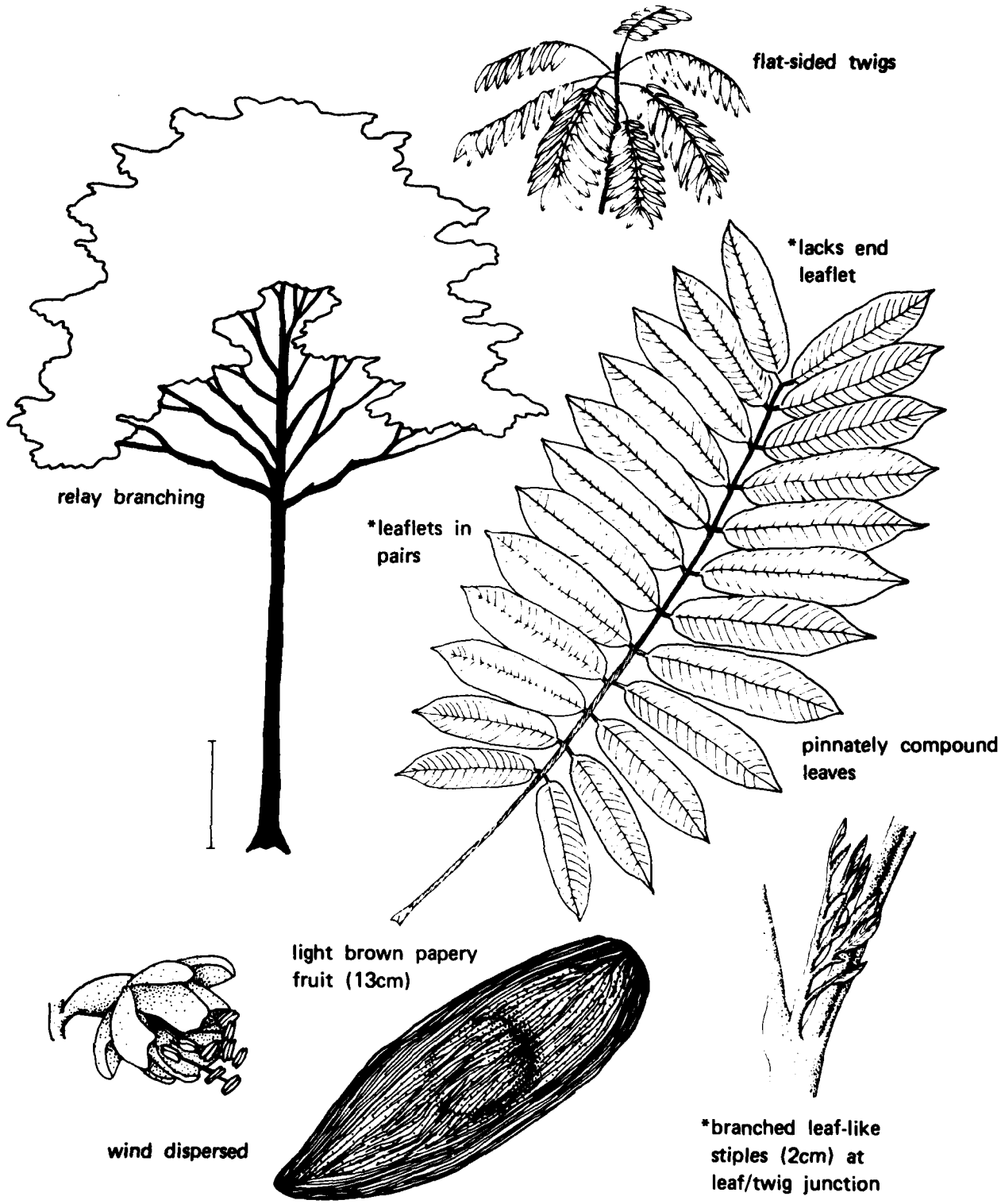

Figure 36. *Tachigalia versicolor.*

Xylopia aromatica — Hemlock anon — Annonaceae

Leaves

The leaves (12 by 4 cm) are simple, alternate, thick, glossy-green on top, grey and fuzzy below. The leaf stalk is short (4 mm). There are raised bumps on the younger twigs. Leaves grow only on the ends of the branches.

Tree Shape and Trunk

This is a small tree (10 meters), with a thin main trunk that often arches. It has long, drooping branches, with many conspicuous dead twigs near the trunk and leaves at the tips. The general shape is similar to an evergreen tree, and is easily recognized from a distance.

Flowers and Fruits

In May and June, at the beginning of the wet season, flowers (3.5 cm) bloom along the branches. The flowers have six narrow, yellow petals, with the outer ones being slightly longer. The fleshy fruits split open to expose six black, oval seeds (5 mm) that remain on the tree until the following dry season. These features are shown in figure 37.

Abundance and Habitat

This tree is found frequently in young forests and disturbed areas. It is found mostly in dry areas but also in moist areas.

Similar Species

No other species has such drooping branches with dead twigs near the trunk. The other local species in this genus is Xylopia fructescens, which has very dense foliage with shorter, curved-up branches.

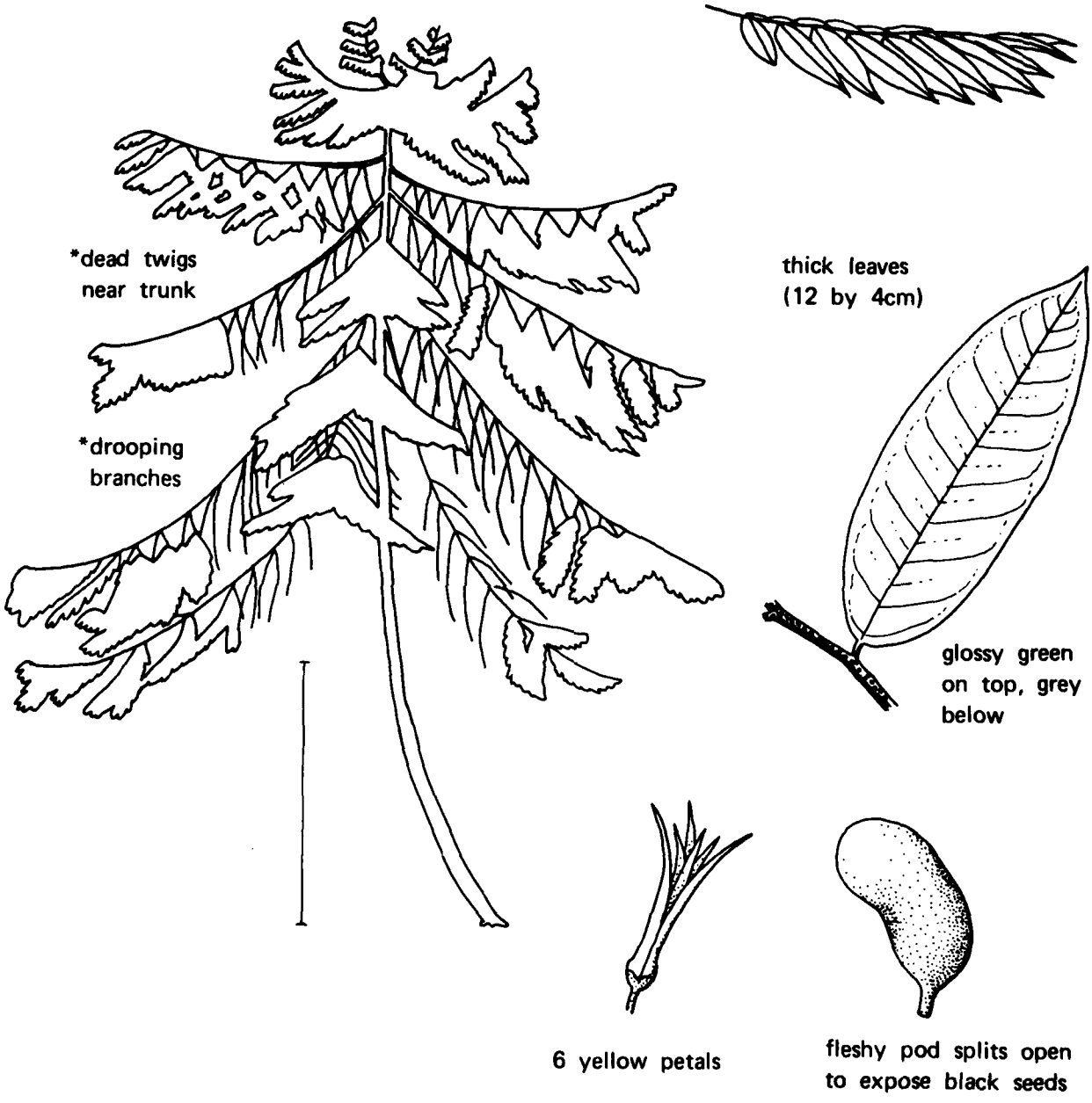

Figure 37. *Xylopia aromatica.*

Guazuma ulmifolia — Huazu — Sterculiaceae

Leaves

The leaves are simple, alternate, long and thin (12 by 4 cm), and heart-shaped. The edges are toothed and the leaf base is lobed unevenly. The leaf shape of this species varies. Three to seven main veins meet at the leaf base. The leaf stalks are short (1 cm) and swollen at both ends. The twigs are covered with short hairs.

Tree Shape and Trunk

This tree is about 15 meters tall, with lots of spreading, drooping branches leaving the trunk near the ground, giving the tree a scraggly look. The trunk is not distinctive.

Flowers and Fruits

From March through May, and from September through November, clusters of small (3 mm), yellow-green flowers appear along the topside of the branches. Fruits grwo from March to September, with a few old fruits remaining on the tree longer. The fruits are round (4 cm) and woody, with many irregular vertical grooves and warty ridges. At maturity, the fruit is black with a pulpy inside containing numerous seeds. These features are shown in figure 38.

Abundance and Habitat

Locally, this tree is found frequently in open, disturbed areas of moist and dry habitats. Often it is seen along the roadside.

Similar Species

The leaves are somewhat similar to Trema, but Trema has fewer branches, and they are straight, not drooping like Guazuma.

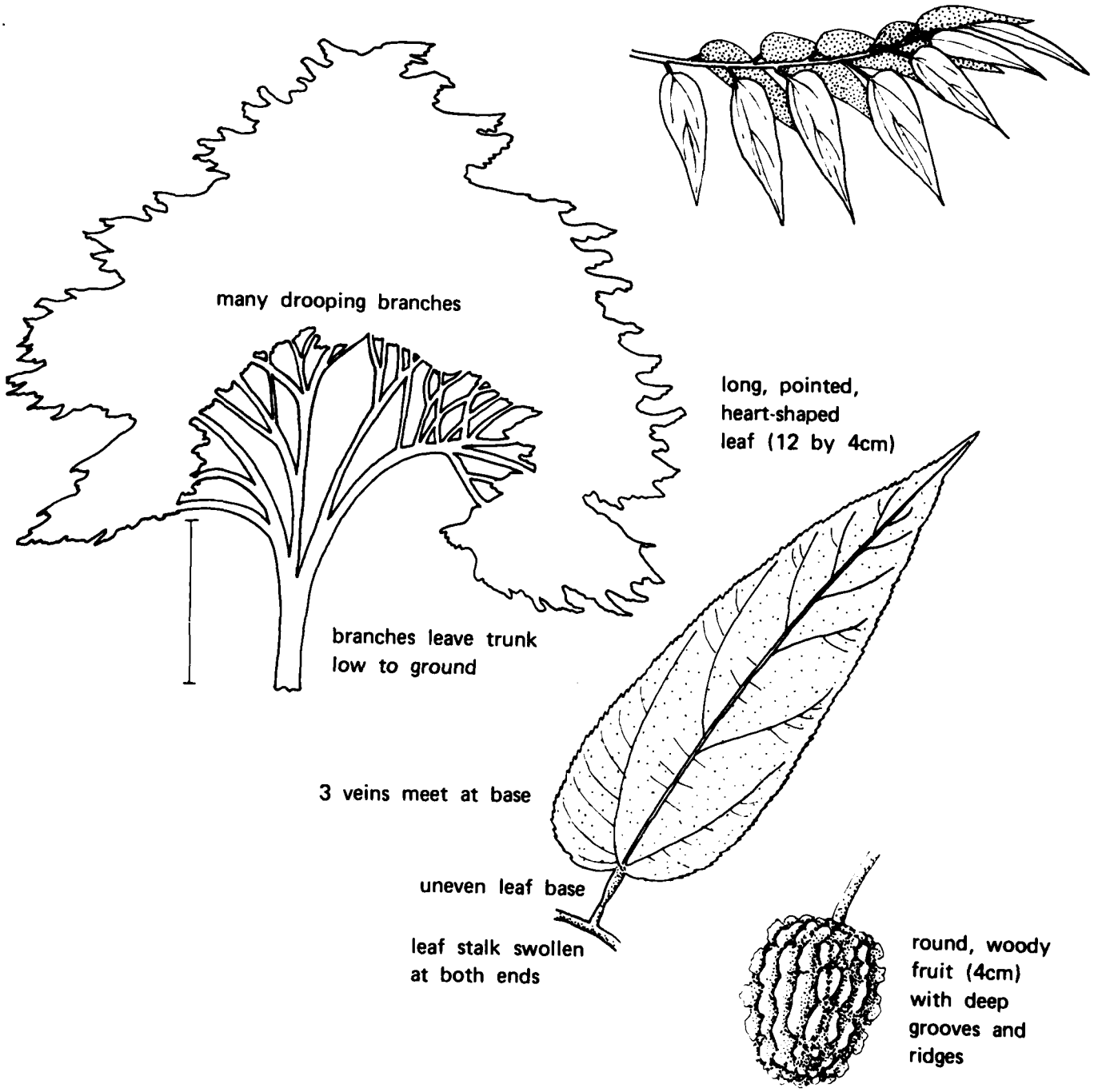

Figure 38. *Guazuma ulmifolia.*

Byrsonima crassifolia Nance Malpighiaceae

Leaves

The dark green, leathery leaves (11 by 5 cm) are simple and opposite, with slender bases and pointed tips that hook down. The thick leaf stalks are 1 centimeter long. Especially when young, small twigs, and the undersides of leaves, are covered with downy brown hairs. The leaves stick out horizontally from their twigs. Leaves turn red and fall in December and January, reappearing in March.

Tree Shape and Trunk

This is a small (13 meter), rather stocky tree. The bark is smooth with small grooves, reddish brown in color with red, orange, and white horizontal patches.

Flowers and Fruits

Flowering peaks from March through June, although some flowers may be present November through July. Stalks (20 cm) at the branch tips support many yellow flowers (1.5 cm) which turn red-orange when older. Flower petals are flaired at the tips, and there are conspicuous glands at the base of each flower. During August and September, berries (1.5 cm) hang down from a stalk. The berries are green when young and turn yellow or orange when mature. These features are shown in figure 39.

Abundance and Habitat

This tree is found frequently in disturbed areas and forest edges in both wet and dry areas.

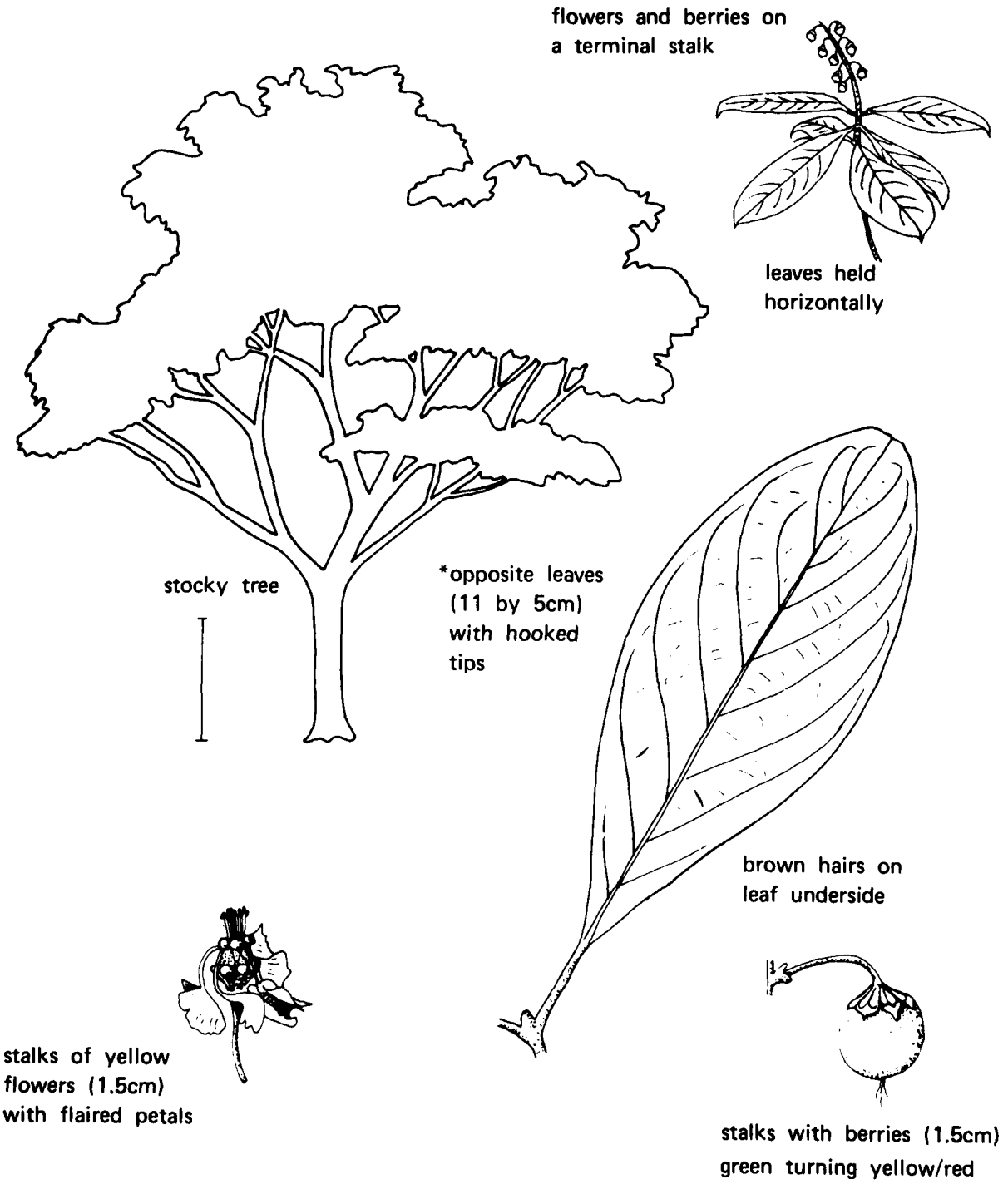

Figure 39. *Byrsonima crassifolia.*

Leaves

The leaves are alternate and pinnately compound, with 10 to 20 opposite leaflets (10 by 4 cm). There are long spines scattered along the midrib of the leaflets and on the leaf stalk. Translucent, clear dots are visible on the leaf if it is held against the light. Crushed leaves have a pungent smell somewhat like citrus. Trees lose their leaves for a short time in the dry season.

Tree Shape and Trunk

Tree height is about 25 meters. The tree shape is not very distinctive. Sometimes, the trunk is buttressed slightly. The bark is rough and has cone-shaped or flat spines, sometimes obvious only on younger branches.

Flowers and Fruits

From June through September, inconspicuous, small white flowers bloom on branched spikes at the ends of branches. From June through December, brown capsules containing shiny black seeds (3 mm) are clustered on branched spikes at the ends of branches. These features are shown in figure 40.

Abundance and Habitat

Trees of this genus are found occasionally in all habitats, especially moist, young and mature forests.

Similar Species

There are four species of *Zanthoxylum* which are very similar: *Z. beliziense*, *Z. procerum*, *Z. setulosum*, and *Z. panamense* (the latter is most common). All have similar fruit and leaves, and all have spines on the trunk and leaf stalk. In *Z. beliziense* the spines are flattened and arranged parallel to the ground. In *Z. setulosum*, the spines are large, cone-like, and blunt. In both *Z. panamense* and *Z. procerum* the spines are cone-like and pointed.

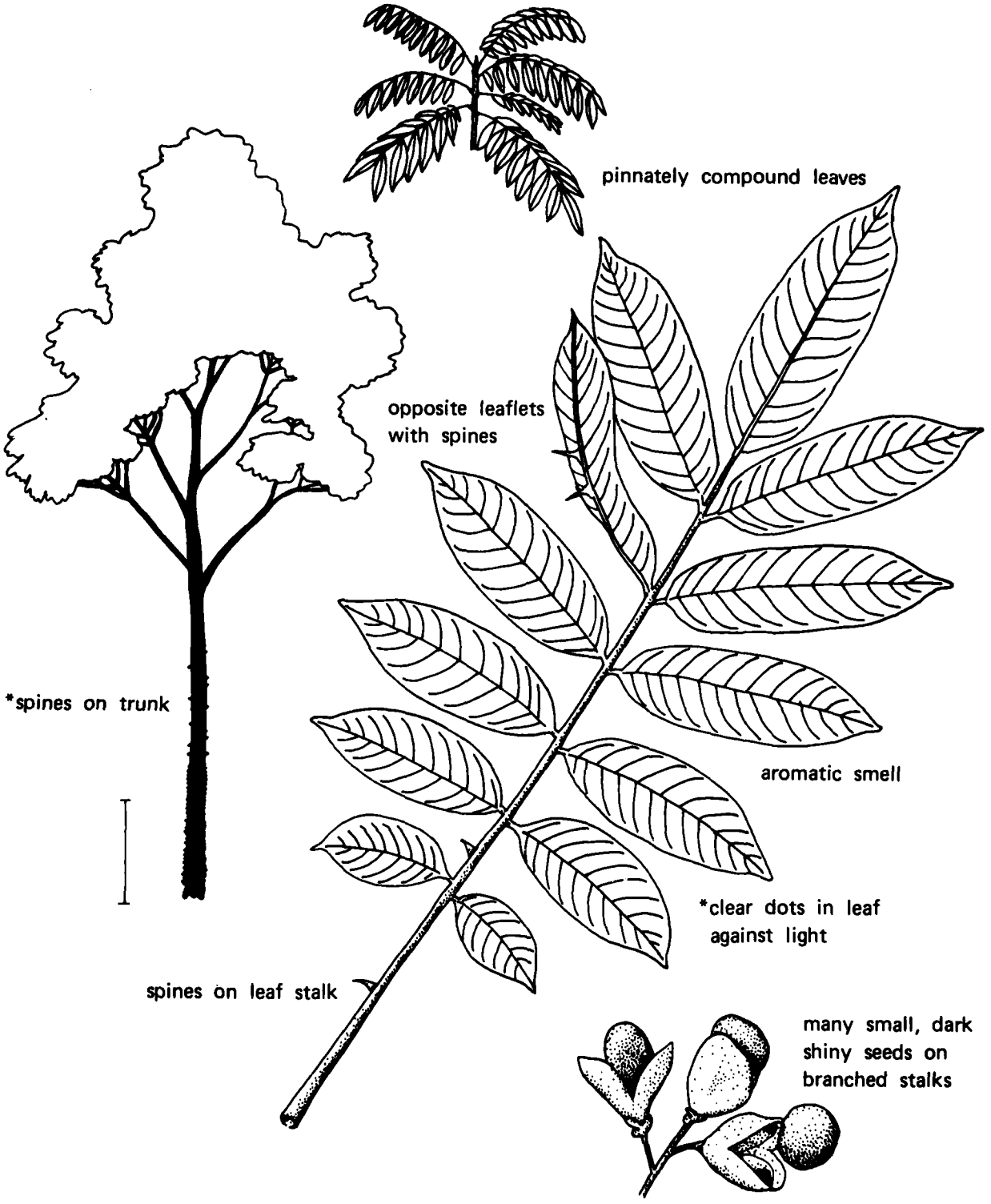

Figure 40. *Zanthoxylum* species.

Cordia aliodora — Laurel — Boraginaceae

Leaves

The leaves (13 by 6 cm) are simple, clustered in whorls, pointed at both ends, and widest just beyond the middle. There are many white, star-shaped hairs on the leaves and stems, making the leaves feel slightly sand-papery. White, raised spots can be seen on the branches. The branching is very distinctive; whorls of leaves and small twigs grow out of swollen joints. These swollen areas are inhabited by ants. The tree is unusual in that it loses its leaves in May and June. Because most other trees have leaves then, this tree is conspicuous, and it is easy to see the whorls or sprays of twigs at the branch tips.

Tree Shape and Trunk

Tree height is about 25 meters. Relay branching patterns can be seen on medium-sized branches; the smaller branches are in obvious whorls, with swollen joints. All the leaves are at the branch tips. The bark on younger trees is smooth, turning coarse with age. There are raised white dots on the smaller braches. The sap smells sweet.

Flowers and Fruits

During February and March, masses of small (5 mm), white flowers grow near the branch tips. The white color is obvious from the ground. In April and May, the flower dries into a light brown fruit, which swells at the base near the seed. Seeds are wind dispersed. These features are shown in figure 41.

Abundance and Habitat

Locally, This tree is frequent in young, moist forests, and less frequent in young, dry forests.

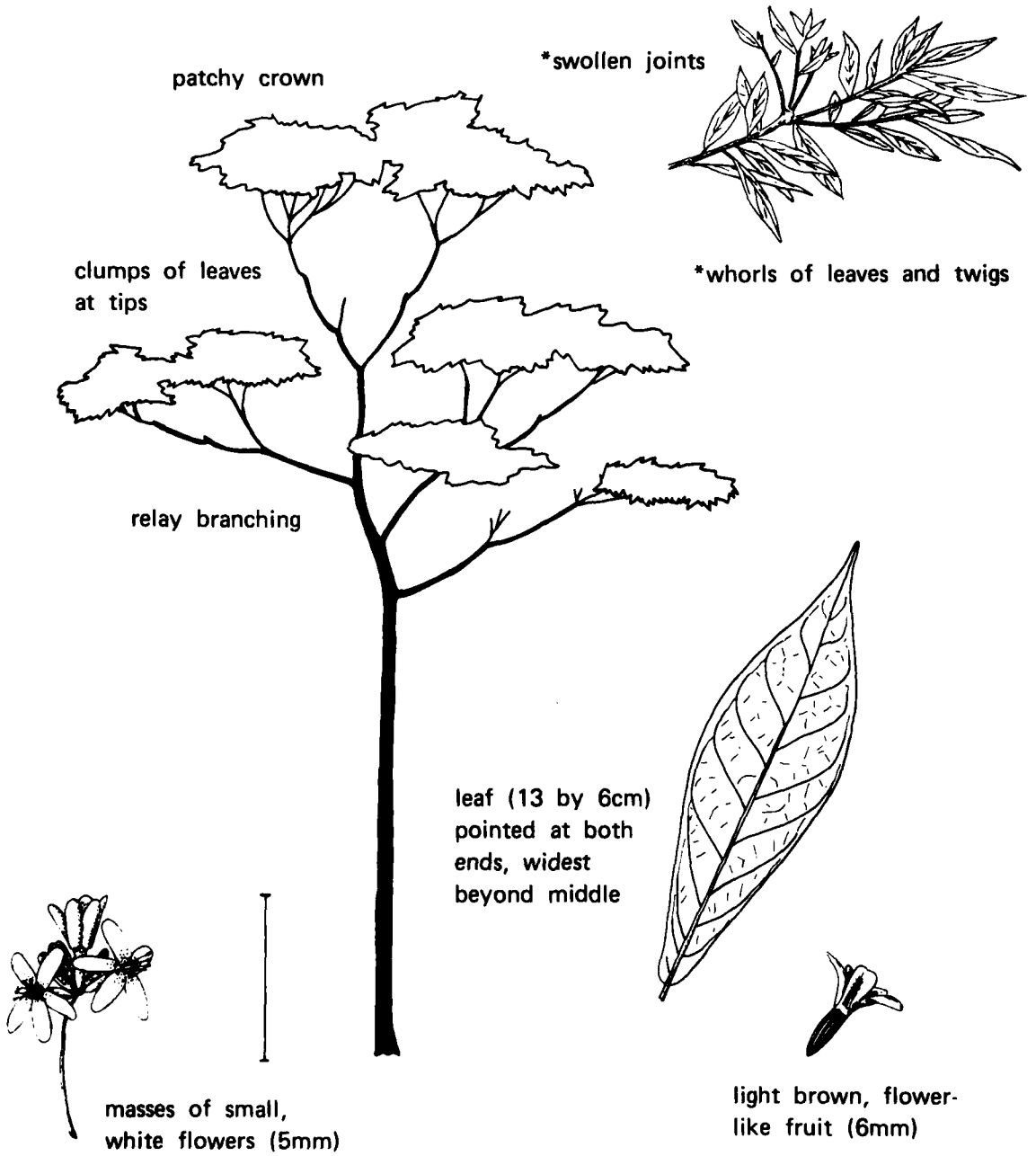

Figure 41. *Cordia aliodora.*

Bursera simarouba — Gumbo Limbo — Burseraceae

Leaves

The leaves are alternate and pinnately compound, with five to nine leaflets (10 by 5 cm). The leaflets are opposite with one at the tip, and have very uneven bases. Young leaves are furry, but become hairless with age. Crushed leaves smell like turpentine. The tree is leafless from February to April.

Tree Shape and Trunk

Average tree height is 20 meters. Branches and trunk are curved irregularly. The smooth, copper-colored bark peels off in thin strips revealing an inner, greenish bark. There is a strong turpentine smell to the trunk and sap.

Flowers and Fruits

From March to June, flowers bloom on stalks along the branches. These flowers have the appearance of new leaves: they are shallow bowls, with small (3 mm), greenish-white petals. From November to January, and occasionally throughout the year, the tree fruits. The fruits are elliptical, fleshy capsules (1 cm), with three flattened sides. Green when young, they turn reddish brown at maturity, and open to expose a white seed (7 mm). These features are shown in figure 42.

Abundance and Habitat

This tree is found occasionally in both wet and dry, young forests, but particularly in drier areas. The leaves are very similar to Spondias, but no other tree has the distincitive copper, peeling bark of Bursera.

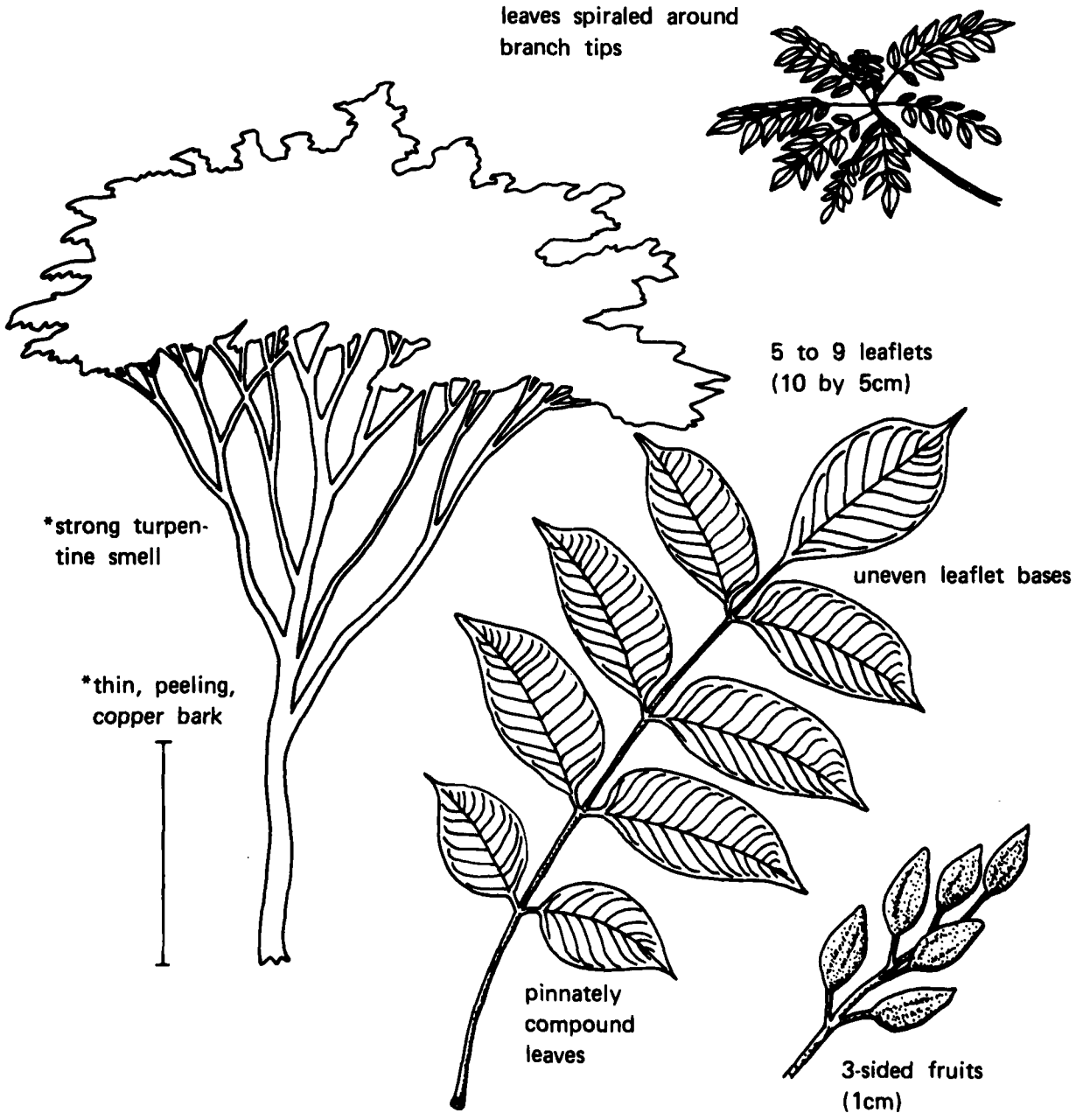

Figure 42. *Bursera simarouba.*

Spondias mombin — Monkey plum — Anacardiaceae

Leaves

The leaves are alternate and pinnately compound, with 9 to 19 leaflets (10 by 4 cm). The leaflets near the tip are opposite each other, while the ones near the base are alternate or staggered. The leaflet bases can be asymmetrical and the stalks are short (6 mm). The leaves are glossy green and leathery. There is a prominent vein running along the margin of each leaflet. Crushed leaves smell like turpentine or mango. The tree is leafless from December to April.

Tree Shape and Trunk

Tree height is about 25 meters. The trunk and branches often are crooked, so the shape is variable. The bark is grey and rough; on older trees, raised, croky ridges run vertically.

Flowers and Fruits

From March through June, many small (7 mm), white flowers grow on branched stalks at the branch tips. From August through September, oblong fruits (3 cm) hang in clusters. These fruits are green when young and ripen to a yellow-orange. A big seed is covered with a layer of sweet, edible flesh and a thin skin. These features are shown in figure 43.

Abundance and Habitat

This tree is common in young and mature forests of both dry and moist areas.

Similar Species

Spondias radlkofera is very similar to, and hard to distinguish from, S. mombin. The bark of S. radlkofera is rough, but does not have corky ridges; the fruits remain green even when mature. Bursera has very similar leaves, but its rusty peeling bark is its unique distinguishing character.

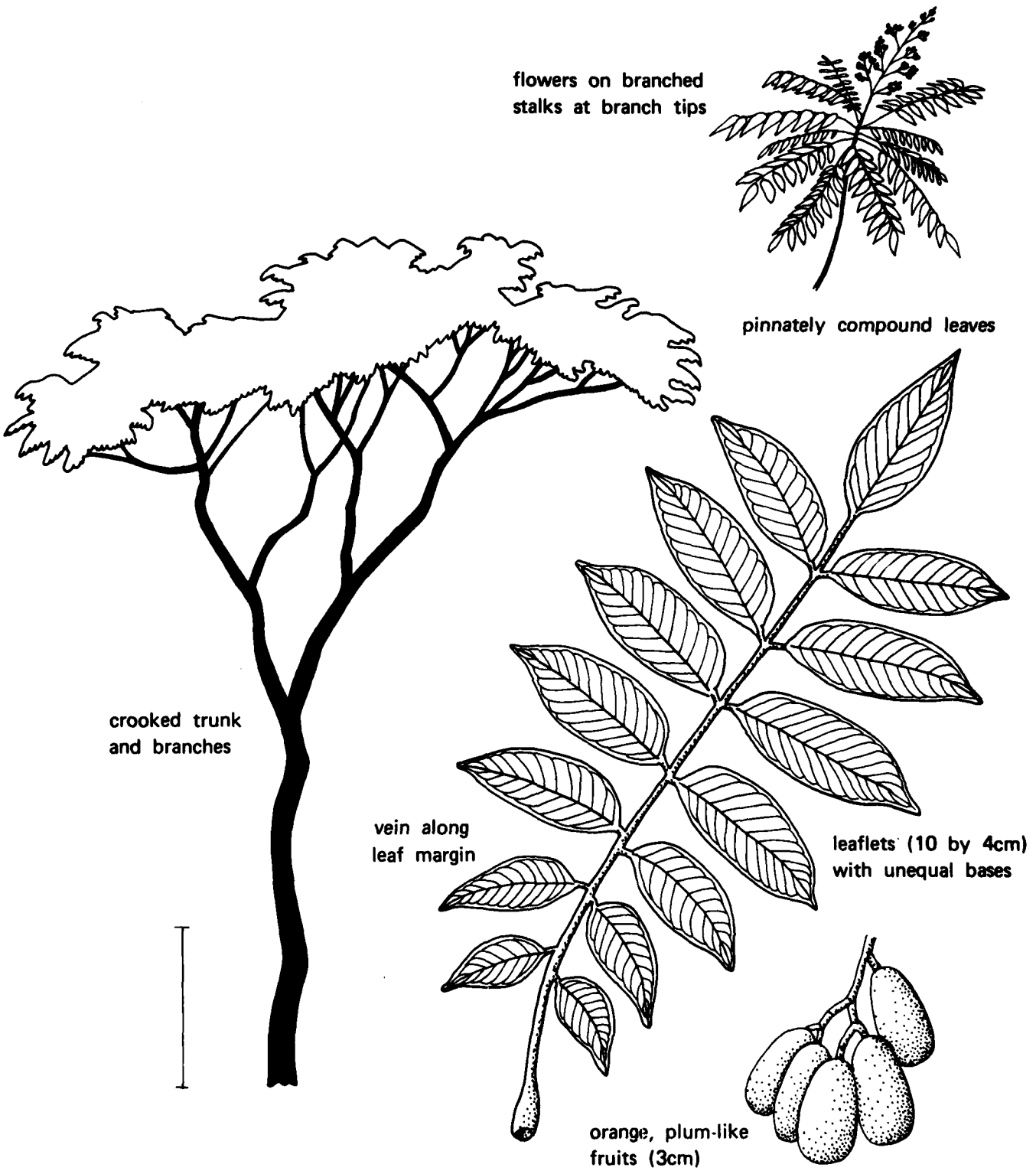

Figure 43. *Spondias mombin.*

Cupania sylvatica — Gorgojo — Sapindaceae

Leaves

The leaves are alternate and compound with, three to seven leaflets (11 by 4 cm). The leaflets are thin and stiff, with a prominent raised midrib and secondary veins. At the tip of the leaf is a pointed projection.

Tree Shape and Trunk

This is a small (8 meters) tree, with lots of drooping branches. Sometimes, there is no strong, central trunk; or there may be sucker shoots and several main stems. The bark is thin, grey, and very smooth.

Flowers and Fruits

During November and May, small white flowers (5 mm) cover stalks which dangle from the branches. From March through June, hairy, woody, wrinkled capsules grow in dense clusters along the branches. At maturity, the red capsules split open to expose two to three shiny black seeds (1 cm), half covered by white flesh. The seeds resemble eyes looking out from the eyelids of the capsule. These features are shown in figure 44.

Abundance and Habitat

Occasionally, this tree is found in young, moist and dry forests.

Similar species

There are three other species of Cupania that have similar fruits. C. rufescens has larger leaflets covered with brown hairs. C. latifolia has no hairs and wavy leaf edges. C. cinera also has wavy leaf edges, but white hairs grow on the undersides of the leaflets. All these species have pointed projections at leaf tips.

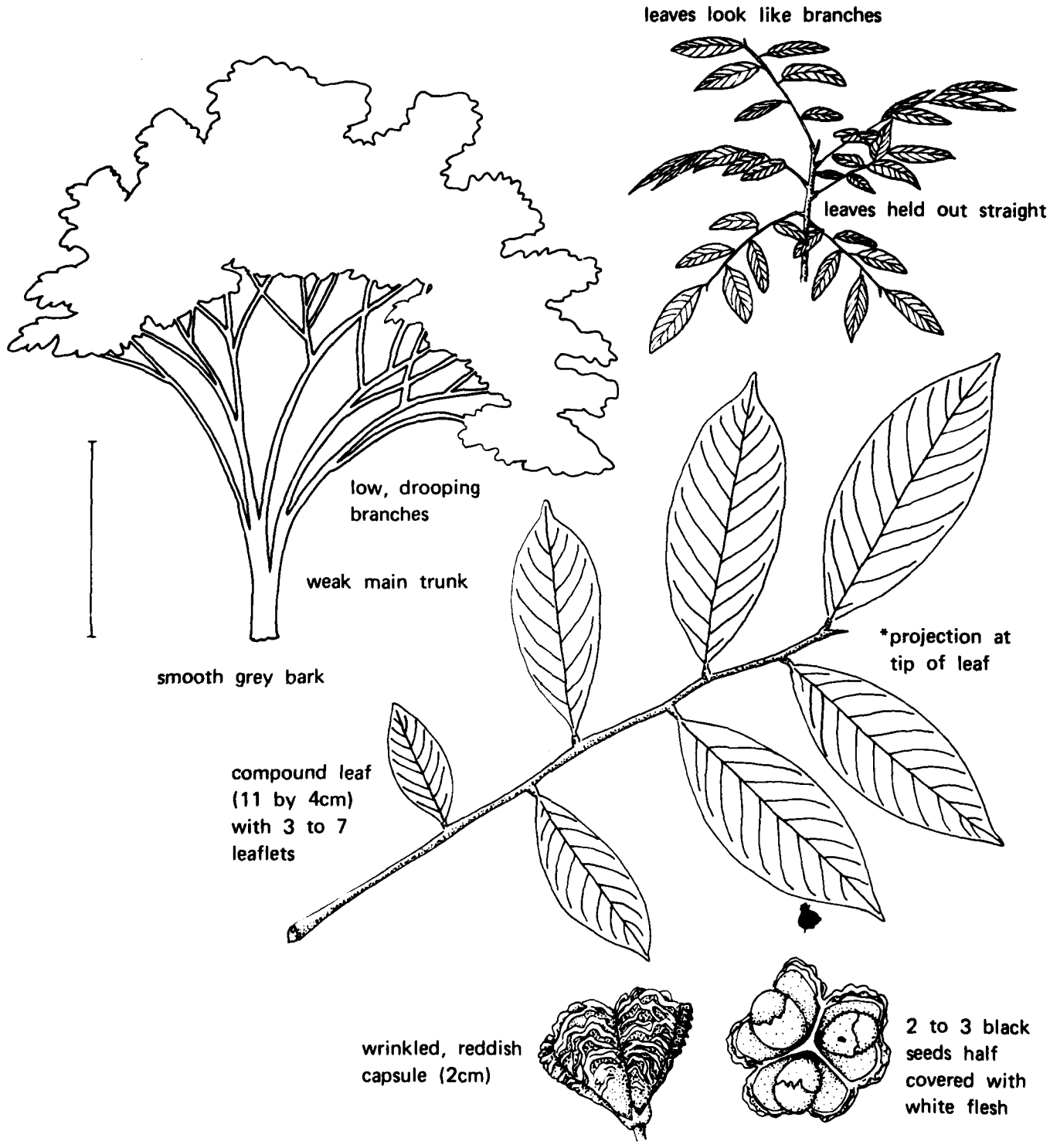

Figure 44. *Cupania sylvatica.*

Trema micrantha — Capulin — Ulmaceae

Leaves

The leaves are simple, alternate, narrow (10 by 3 cm), and pointed, with toothed edges. The leaf base, where three veins meet, often is asymmetrical, having uneven lobes. The leaf feels sandpapery to the touch. The leaves are on short stalks (less than 1 cm), and are very spaced evenly along the branches.

Tree Shape and Trunk

Tree height can reach 15 meters. The tree has a slender trunk with long, straight branches. The bark is light brown, smooth to slightly rough with raised bumps, but without grooves.

Flowers and Fruits

From June through October, clusters of small (2 mm), greenish-white flowers grow along the branches. During this same time, small (4 mm), round berries (green when young and red when mature) grow in clusters along the branches. These features are shown in figure 45.

Abundance and Habitat

This tree is rare in mature forests, but is found occasionally in both moist and dry disturbed areas.

Similar Species

Trichospermum has similar leaves but the leaf stalks are doubly swollen, and the leaf bases are not uneven like those of Trema. From a distance, it is easier to distinguish the two species by shape. Trichospermum has sprays of short branches at the tips of the larger branches, while Trema has fewer and longer straight branches. Guazuma has uneven leaf bases, but the tree shapes are different: Guazuma has curved drooping branches.

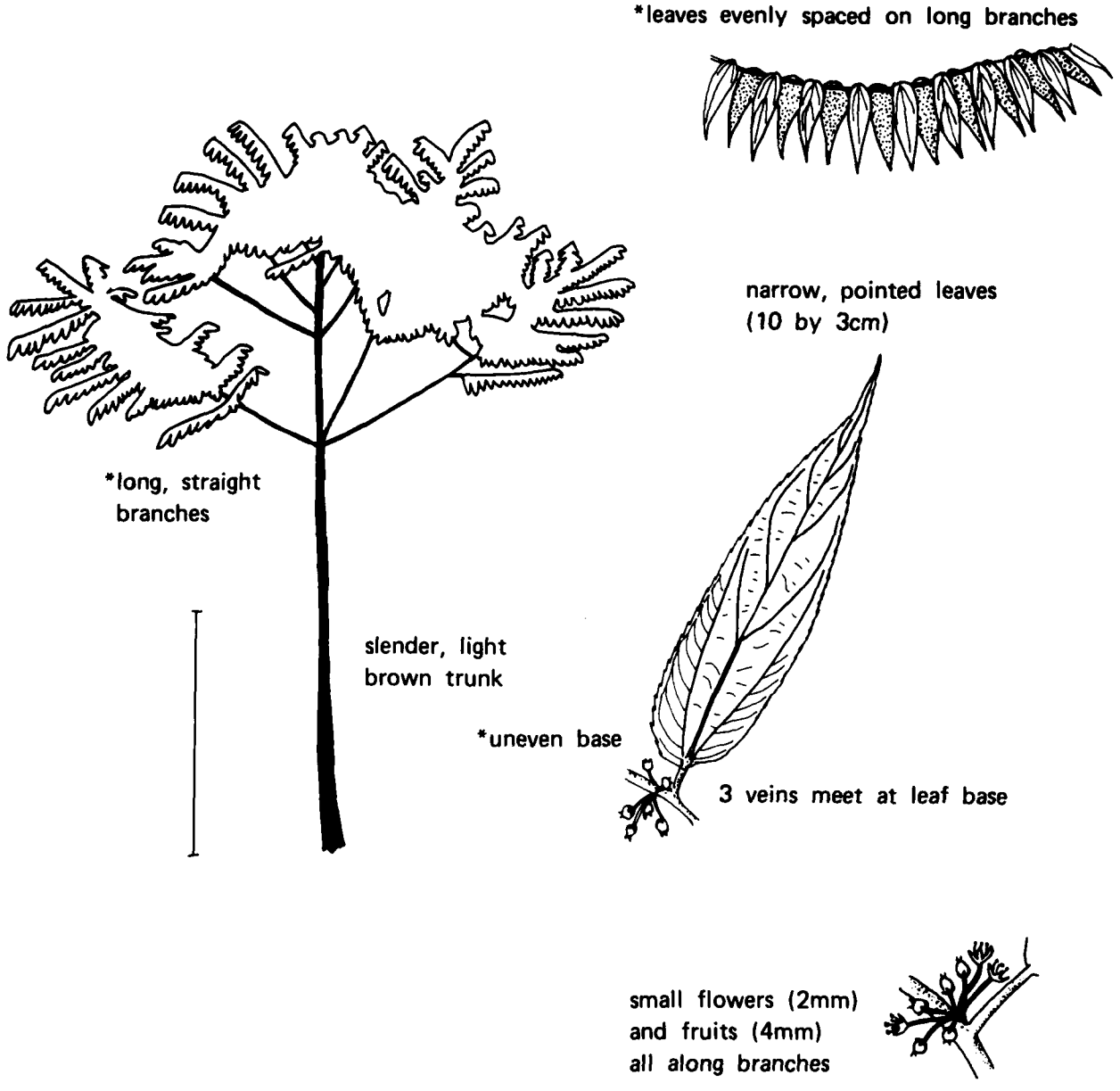

Figure 45. *Trema micrantha.*

Terminalia amazonica — Amarillo — Combretaceae

Leaves

The simple, small (8 by 3 cm), dark green leaves are clustered in whorls at the ends of branches. Leaves are tapered at the base and widest near the pointed tip. Leaf stalks, twigs, and some lower leaf veins have many short rust colored hairs. Trees are leafless from February to May.

Tree Shape and Trunk

This tree can be as large as 35 meters. Branches tend to form flat tiers; relay branching is very obvious on small branches. Large trees have tall buttresses, and often, sucker shoots originate around the base. The bark is dark brown and soft, with vertical grooves, and may shed in long flakes.

Flowers and Fruits

From February through May, many small (4 mm), greenish-white flowers grow in clusters on short spikes among the leaves. During this same time, many small (7 mm), brown fruits, with two papery wings for wind dispersal, appear. These features are shown in figure 46.

Abundance and Habitat

This tree is occasionally found in moist, mature forests.

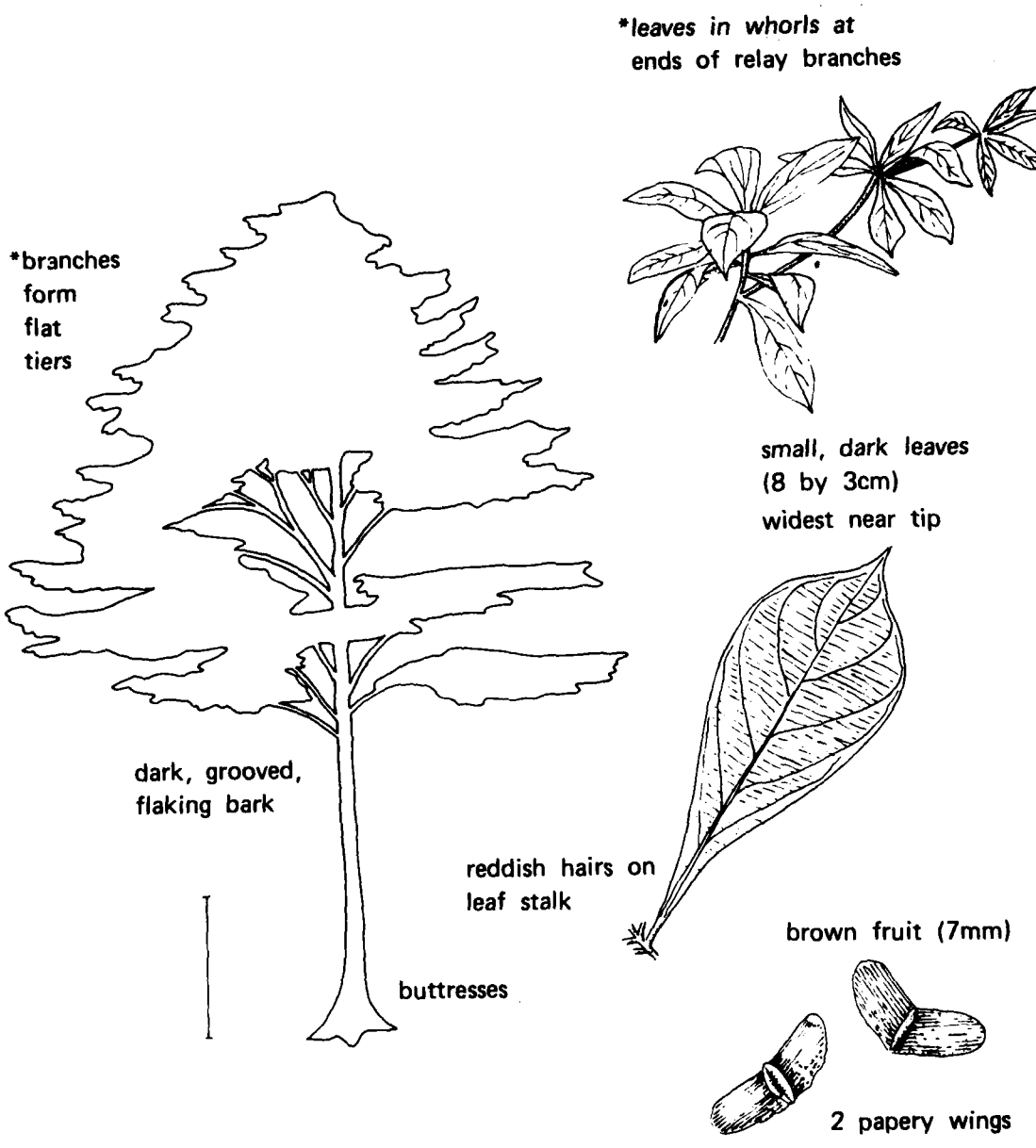

Figure 46. *Terminalia amazonica.*

Platypodium elegans — Carcuera — Papilionoideae

Leaves

The leaves are alternate and compound, with 10 to 20 leaflets (5 by 2 cm). The thin, delicate leaflets have notched tips and inconspicuous veins.

Tree Shape and Trunk

Generally, this tree is 30 to 45 meters tall. The trunk and branches are irregular and curved, and the crown is small and feathery. The trunk is very distinctive, with long, vertical invaginations that make it look like a loosely twisted or knotted rope.

Flowers and Fruits

Every 2 years, from April to June, yellow pea-like flowers (1-2 cm) are produced. The fruit is large (13 by 3 cm), green and winged. It ripens slowly and remains on the tree for a long time. These features are shown in figure 47.

Abundance and Habitat

Occasionally, this tree is found in moist, mature forests.

Similar Species

Other legumes, such as Enterolobium, have feathery leaves, but the leaflets of these trees are much smaller (1 cm) than Platypodium, and their trunks are smooth. Platypodium is the only tree with feathery leaves and a twisted rope trunk.

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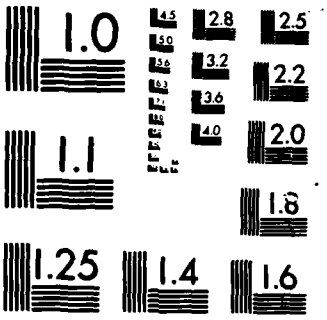

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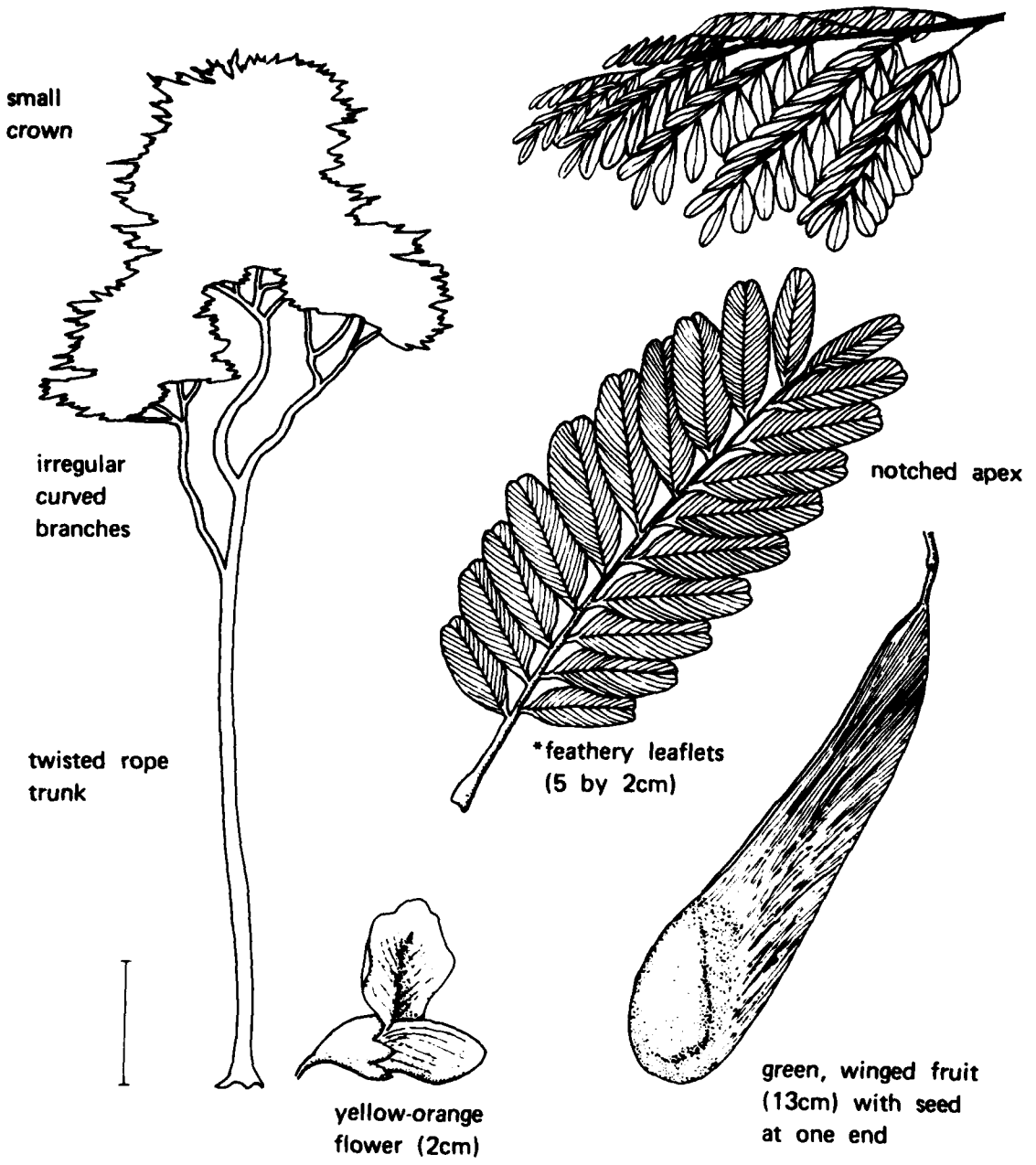

Figure 47. *Platypodium elegans.*

Xylopia fructescens — Malaguento — Annonaceae

Leaves

The leaves are simple, alternate, small (5 by 1 cm), stiff, and pointed. They are dark green on top, and silky grey underneath. From a distance, the leaves look delicate and feathery. The stems are hairy.

Tree Shape and Trunk

This is a slender tree, with a very small, dense crown that looks like a ball of leaves near the top of the trunk. The branches are curved so that the tips point up.

Flowers and Fruits

From April through June, small (1 cm), greenish-white flowers grow in bunches of one to five along the branches. From January to April, fruits grow along the branches. These fruits split open to display three small (6 mm), black seeds in a fleshy red pod (1 cm). These features are shown in figure 48.

Abundance and Habitat

This tree is found frequently in young, dry and wet forests.

Similar Species

No other species has such a small crown with upturned branches. Xylopia aromatica, the other local species in the same genus, has drooping branches which are bare of leaves near the trunk.

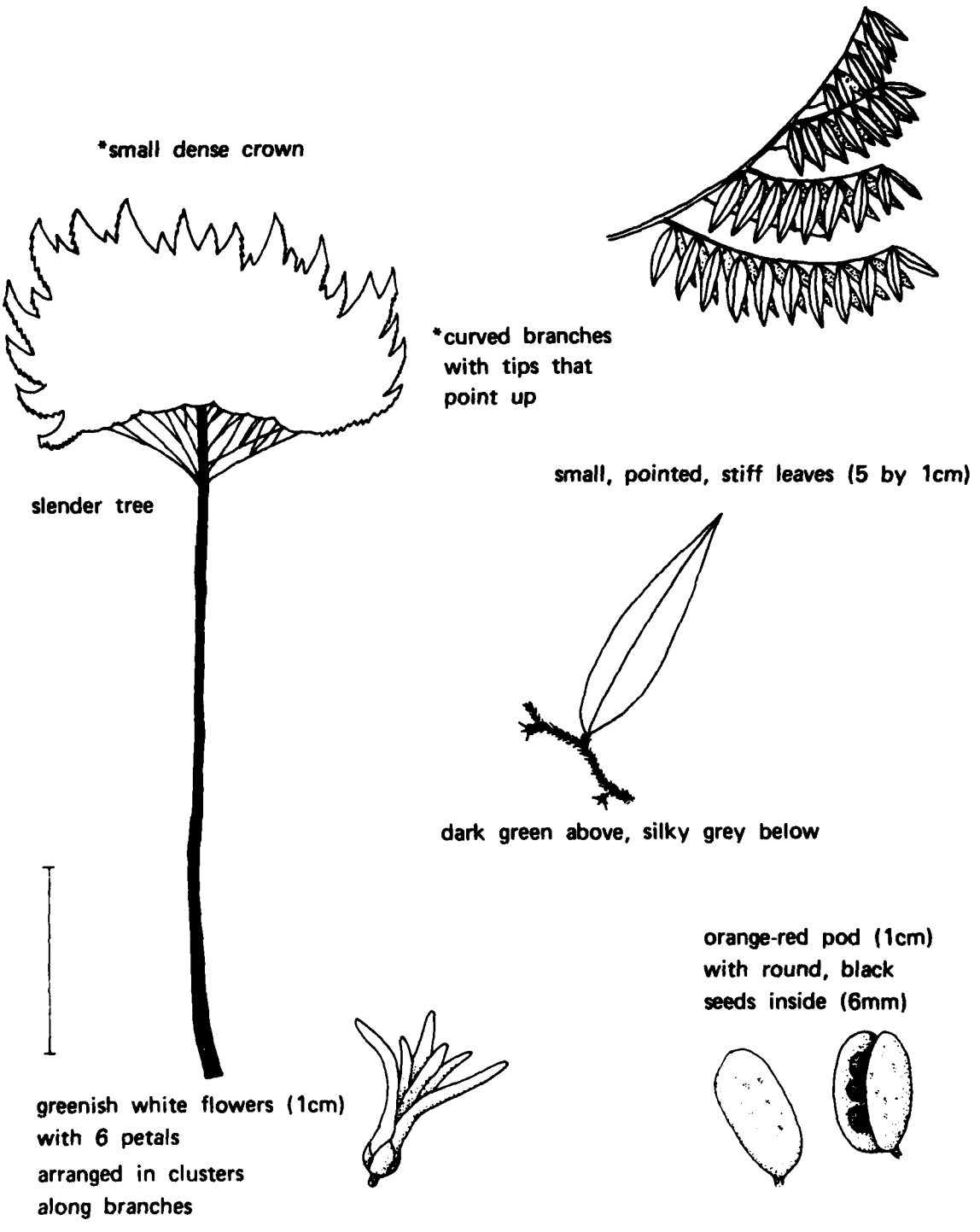

Figure 48. *Xylopia fructescens.*

Enterolobium cyclocarpum — Guanacaste — Mimosoideae

Leaves

The leaves are alternate and compound, with many small leaflets (10 by 3 mm). From a distance, the leaves look very feathery. The tree is leafless for a short time in the dry season, and blooms at the same time it puts on new leaves.

Tree Shape and Trunk

The tree has a very distinctive shape, with several large branches splitting low on the trunk and spreading to form a very large crown. The bark is smooth and grey, often with orange patches of lichen.

Flowers and Fruits

From January to May, at the same time as the tree puts on new leaves, white powder-puff flowers (1.5 cm) grow along the branches. One year after flowering, fruits develop. The fruit is a brown pod curved into a circle (11 cm diameter), with wavy edges and a circle of bumps over the seeds. Seeds (1.5 cm) are brown, with a light ring sketched on the surface. These features are shown in figure 49.

Abundance and Habitat

This tree is found frequently in moist and dry forests and in cultivated areas. Often, it is present in the forest, probably remaining from an earlier cultivated period.

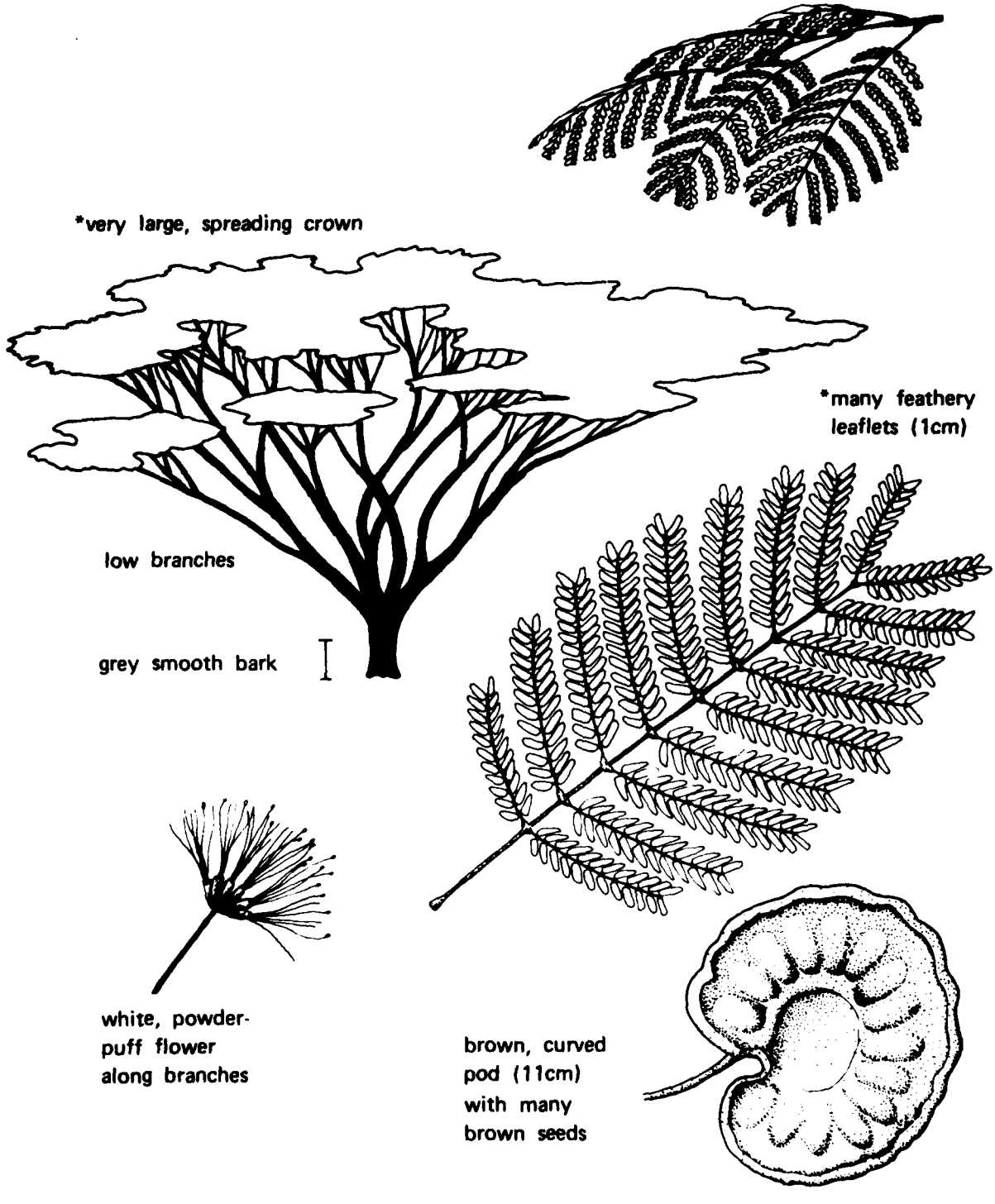

Figure 49. *Enterolobium cyclocarpum.*

Astrocaryum standleyanum — Black Palm — Palmae

Leaves

The leaves are 2 to 4 meters long, with green upper surfaces and whitish undersides.

Tree Shape and Trunk

This is a medium-sized palm (15 meters). The distinctive trunk has long flat spines (12 cm) all over, except for the spineless rings (5 cm wide) spaced evenly every 40 centimeters.

Flowers and Fruits

From May through September, a dense bunch of flowers grows erect at the base of the leaves, but hangs down as the fruits mature (January through June). The green fruits, which turn orange when mature, are oval (4 cm), with sharp points at the tips. These features are shown in figure 50.

Abundance and Habitat

This tree is common in moist areas, particularly in younger forests.

Scheelea zonensis — Royal Palm — Palmae

Leaves

The spineless leaves are 5 to 10 meters long. Leaflets are irregular in length and shape, coming off the main leaf support at odd angles.

Tree Shape and Trunk

The smooth grey bark, the thick trunk (up to 40 cm), and great height (30 meters) make this a distinctive palm. It is the only palm that reaches majestic heights in the forest. Old leaf bases persist at the top of the tree making it broad and cluttered just under the leaves.

Flowers and Fruits

From April to August, a long (2 meters), woody sheath, with longitudinal grooves, partially covers a massive cluster of small yellow flowers at the base of the leaves. A long hanging stalk supports a massive bunch of brownish orange fruits (6 cm). The ripe fruits are present from February to July, but green fruits can be seen most of the year. These features are shown in figure 51.

Abundance and Habitat

This tree is occasional in moist, young forests.

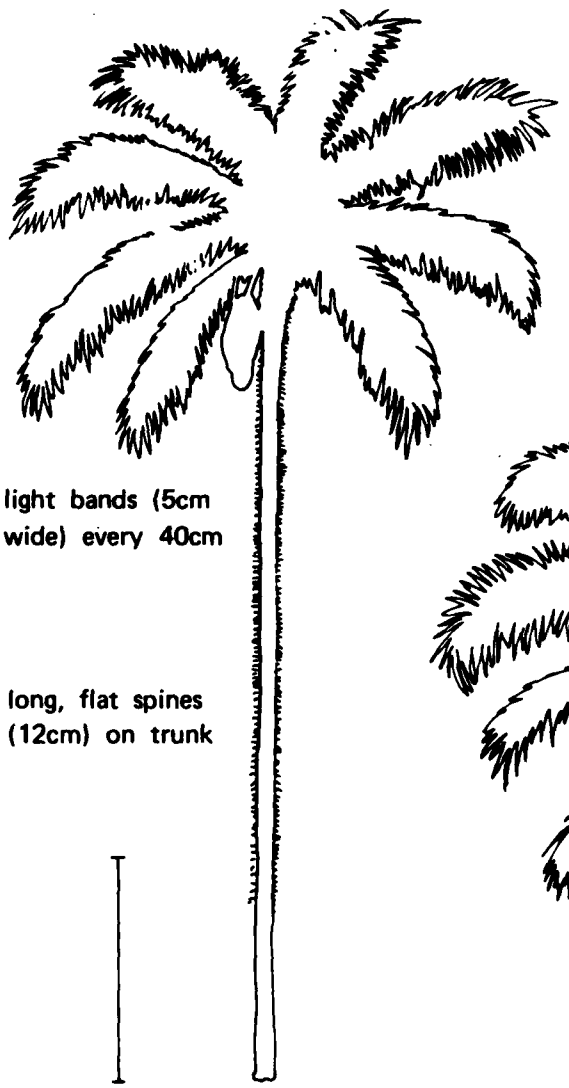

Figure 50. ***Astrocaryum standleyanum.***

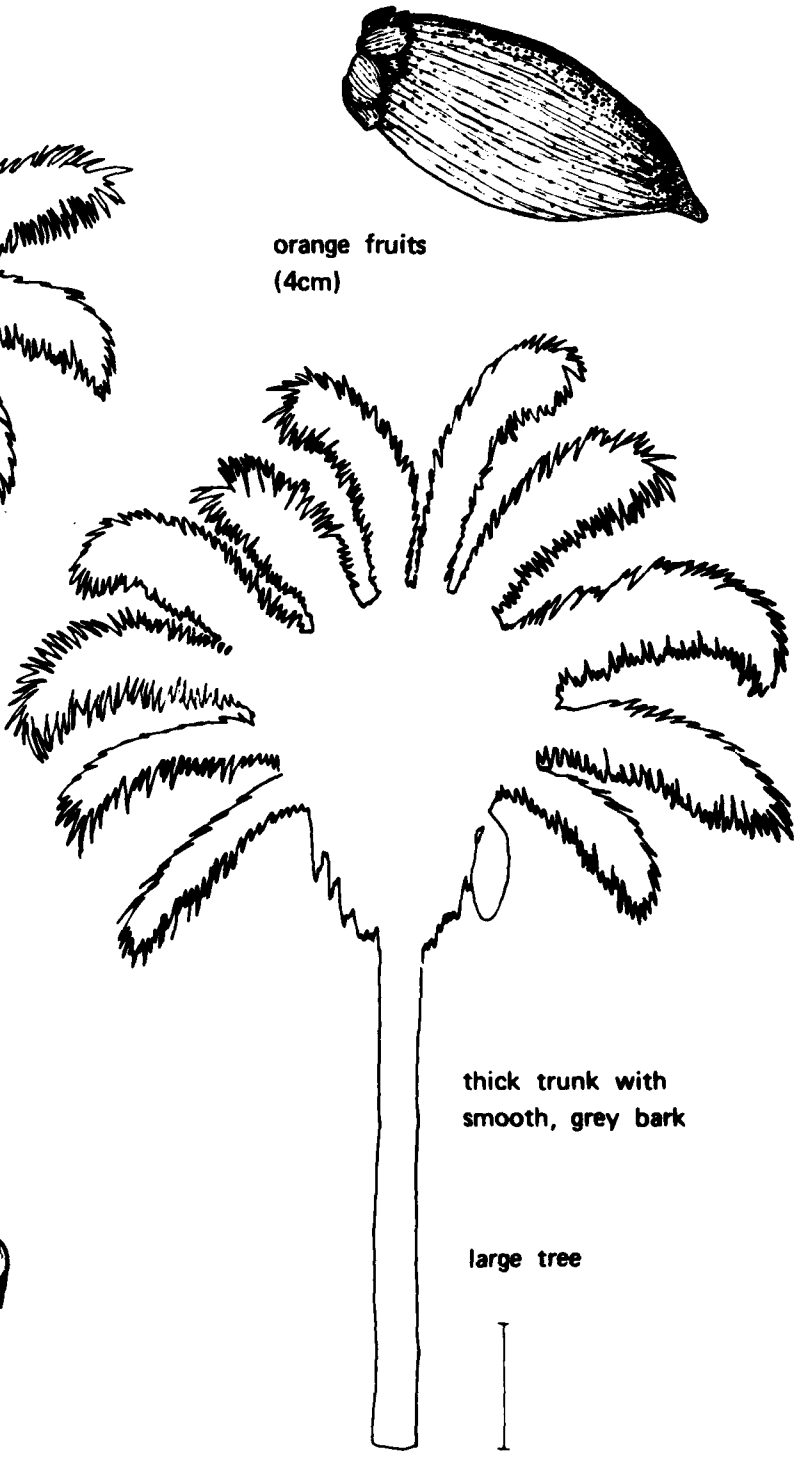

Figure 51. ***Scheelea zonensis.***

Cryosophila warscewiczii — White Palm — Palmae

Leaves

The leaves are large (1.5 m) and pleated to a fan shape, with lobes cut almost to the leaf stalk. The tops of the leaves are green and the bottoms are whitish. Leaf stalks are long (2 m). This is the only palm with a trunk and fan-shaped leaves.

Tree Shape and Trunk

This tree is an understory palm, growing to 10 meters. The trunk is thin, pale-colored, and covered with both straight and branched spines (16 cm).

Flowers and Fruits

The flowers (May through October) and fruits (August through December) are borne in clusters at leaf bases. Fruits are round (1.5 cm), green when young, turning white and fleshy at maturity. These features are shown in figure 52.

Abundance and Habitat

This tree is found infrequently in the understory of moist, young forests.

Elaeis oleifera — Oil Palm — Palmae

Leaves

The leaves are very large (3 m) and spreading; the tips often touch the ground. The bases of the leaves are wide and have curved barbs.

Tree Shape and Trunk

This is a short tree (5 m). The trunk is curved and lies along the ground, with only the last 1 to 2 meters upright. The spreading leaves make the tree wider than it is tall.

Flowers and Fruits

The palm blooms between April and June, and fruits develop from February to May; however, both fruits and flowers may be present year-round. Flowers and fruits grow in dense clusters nestled among the leaf bases. Fruits (3 cm) are orange and shaped irregularly. These features are shown in figure 53.

Abundance and Habitat

This tree grows occasionally in swampy areas.

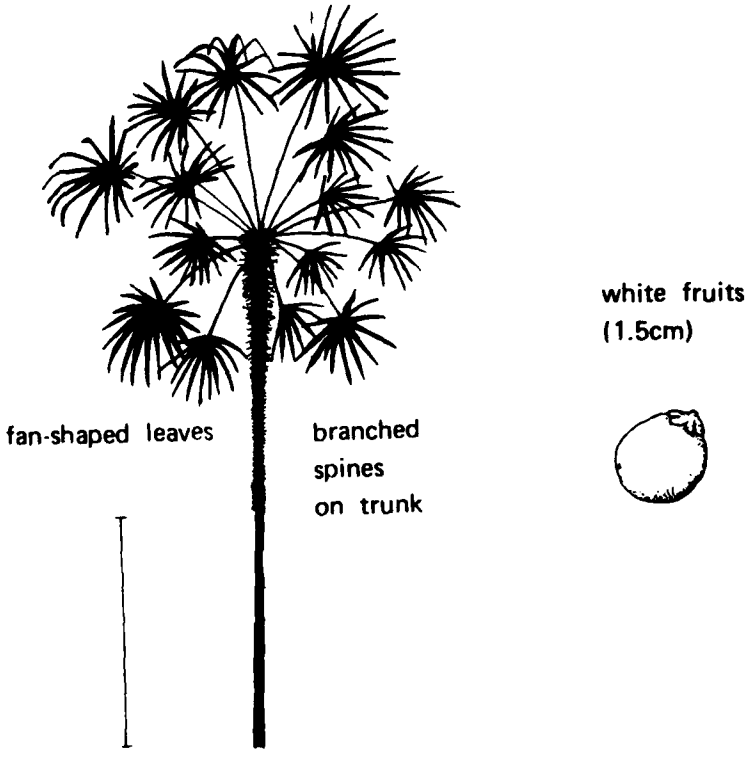

Figure 52 *Cryosophila warscewiczii.*

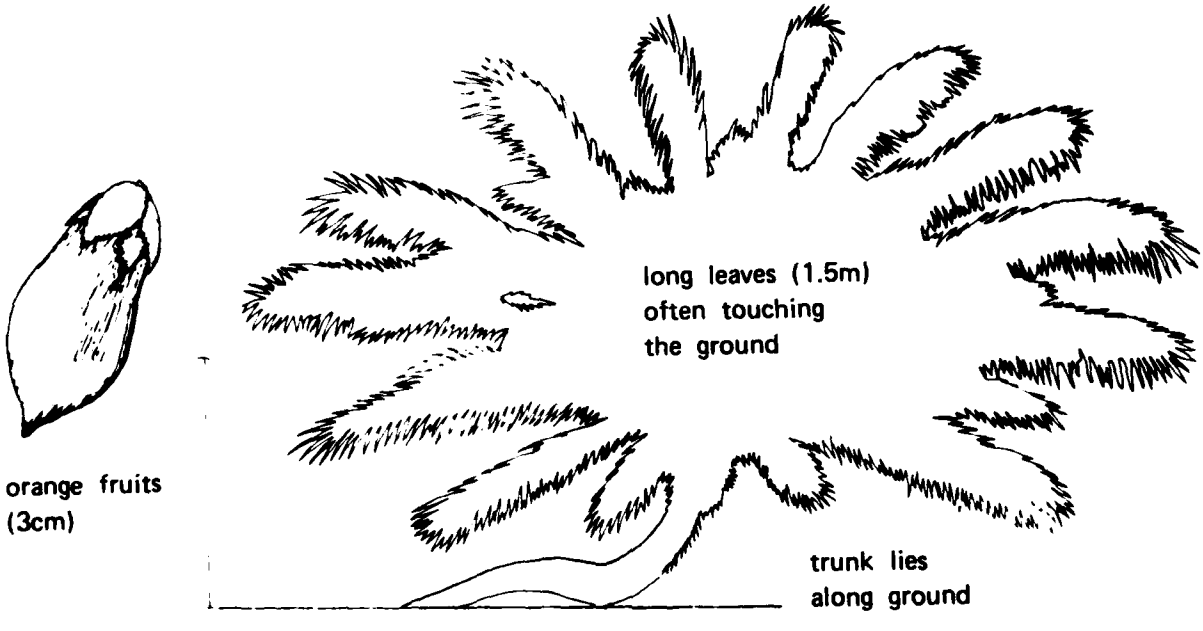

Figure 53. *Elaeis oleifera.*

B. Palms and Understory Herbs

Carludovica palmata — Panama Hat palm — Cyclanthaceae

Leaves: The leaves are large (1 by 2 m), light green, pleated, and split in several places almost down to the leaf stalk. The leaf stalk is round and long (3 m), and rises directly out of the ground.

Flowers and Fruits: Three to four club-shaped stalks (25 cm) rise from the leaf base. In January and February, stalks bloom a whitish color; from April through June, the green skin peels back to expose orange fruits (1 cm). These features are shown in figure 54.

Abundance and Habitat: This plant is common in young and mature, moist forests.

Aechmea magdalenae — Wild pineapple — Bromeliaceae

Leaves: The deep green leaves are long, sword-like blades (2.5 m by 8 cm), with pointed tips and very sharp, recurved barbs along the edges.

Shape: These plants grow in tufts up to 2 meters high, often in dense stands which are impossible to walk through.

Flowers and Fruits: In the rainy season, a large, red, pineapple-shaped structure (12 cm), with lots of orange berries (2 cm), grows on a stalk at the center of the plant. The flowers are yellow. These features are shown in figure 55.

Abundance and Habitat: This plant occurs infrequently in dense patches in moist areas of both young and mature forests.

Bactris major — Palma bravo — Palmae

Leaves: The long (2 meters) palm fronds have sharp spines (5 cm) all along the underside of the midrib.

Tree Shape and Trunk: This small (3 meters) tree has a thin trunk, with sharp, thin spines (7 cm) growing in bands up the trunk.

Flowers and Fruits: From January to March, small, cream-colored flowers cluster at the base of the leaves. From November to January, these flowers develop into clusters of small (4 cm), oval, dull purple fruits. These features are shown in figure 56.

Abundance and Habitat: This tree is found particularly in moist areas.

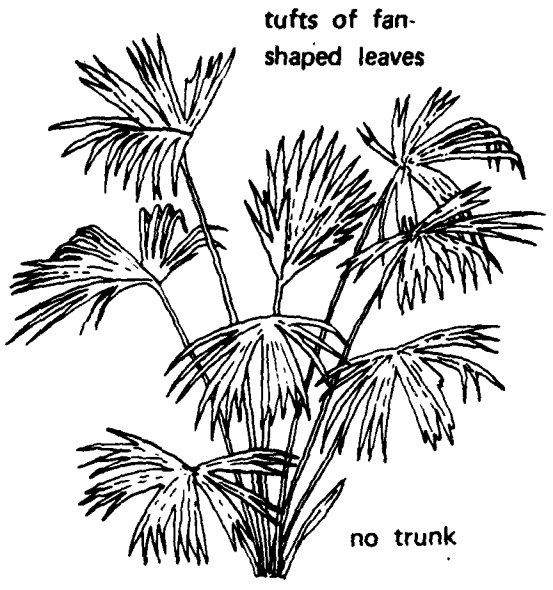

Figure 54. *Carludovica palmata.*

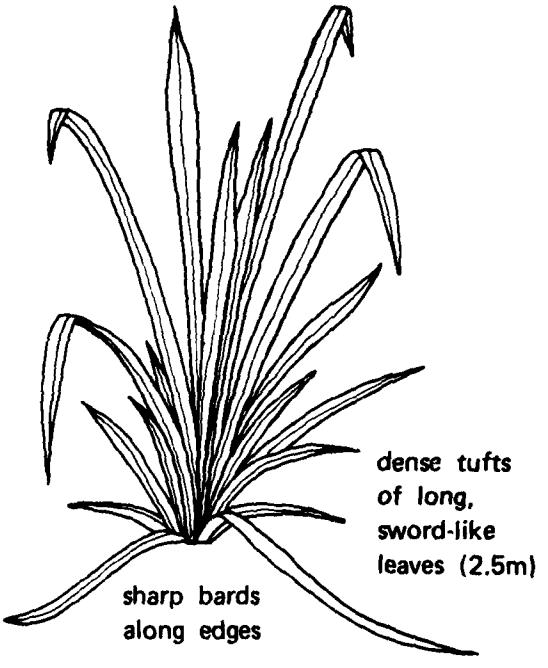

Figure 55. *Aechmea magdalenae.*

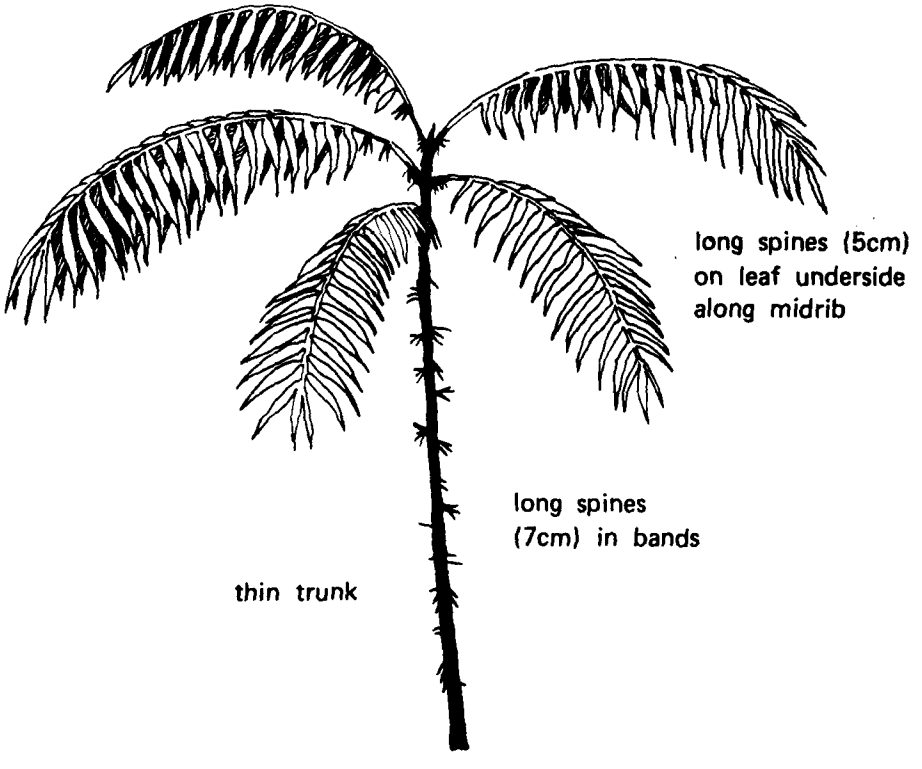

Figure 56. *Bactris major.*

Heliconia mariae — Beefsteak heliconia — Musaceae

Leaves: Long (1 m), upright leaf stalks hold broad leaf blades (2 m by 60 cm) with rounded tips. The secondary veins are evenly spaced (8 to 20 cm), and perpendicular to the raised midrib. The leaf often rips along these veins.

Shape: Leaf bases wrap around each other to form a flattened main stem. The plant grows to about 5 meters.

Flowers and Fruits: Throughout the year, 20 to 70 upside-down red cups grow, packed tightly along a hanging stem. White and lavender flowers (3 cm) poke out from the cups; fruits (1.5 cm) are deep blue. The whole arrangement measures 50 by 10 centimeters. These features are shown in figure 57.

Abundance and Habitat: This herb grows in dense patches in moist areas, in both open and disturbed sites.

Heliconia latispatha — Platanillo — Musaceae

Leaves: Leaves are smaller (80 by 25 cm) than Heliconia mariae, and on shorter leaf stalks (35 cm). The midrib is pronounced, and secondary veins are spaced evenly (4 to 10 cm apart) and perpendicular to the midrib.

Shape: This smaller herb attains a maximum height of 3 meters.

Flowers and Fruits: During the rainy season, flowers and fruits grow in orange or red trough-shaped cups (14 by 3 cm) with yellow edges. The cups, with pointed tips, are arranged spirally around a green, upright stalk. The orange or yellow flowers (4 cm) are hidden inside the cups. Fruits are purple, oblong (1 cm), and protrude from the cups. These features are shown in figure 58.

Abundance and Habitat: Same as that of the Heliconia mariae.

Dieffenbachia species — Dumb cane — Araceae

Leaves: Broad (60 by 30 cm) leaves have rounded bases and slightly pointed tips; white patches and stripes sometimes follow the secondary veins. Leaf stalks are thick, and often have a leafy edge near the base.

Shape: The plant grows to about 2 to 3 meters. The thick (12 cm), green stem lies mostly along the ground, with only the top part erect. Old leaf scars can be seen clearly as tan rings around the stem. The sap contains oxalic acid, which has a skunk like smell, and can burn the skin. These features are shown in figure 59).

Flowers and Fruits: Flowers and fruits grow on club-shaped stalks at the top of the stem, partially surrounded by a leaf-like sheath. Fruits (1 to 2 cm) are yellow to orange. Fruiting varies with the plant species. Flowering occurs from May to September.

Abundance and Habitat: This herb is common in the understory of young and mature moist forests, often found in ravines and along streams.

Similar Species: There are several species of Dieffenbachia which have similar leaves and occur in similar habitats. They are easily distinguished by their fruits.

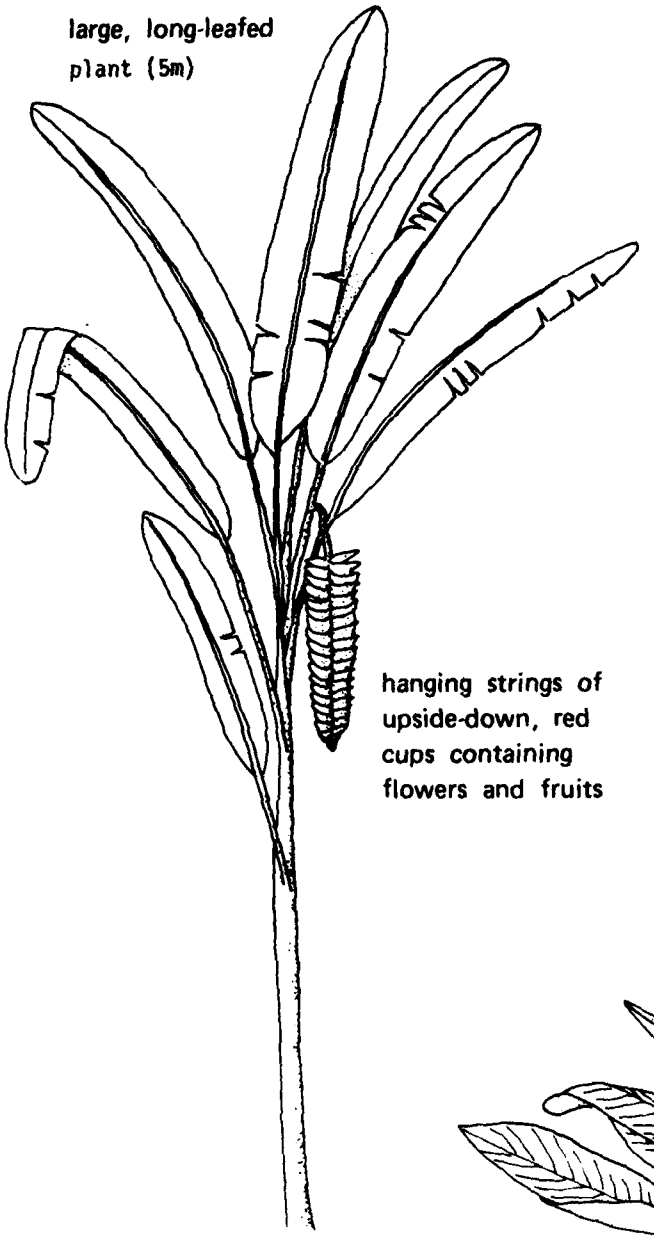

Figure 57. *Heliconia mariae.*

Figure 58. *Heliconia latispatha.*

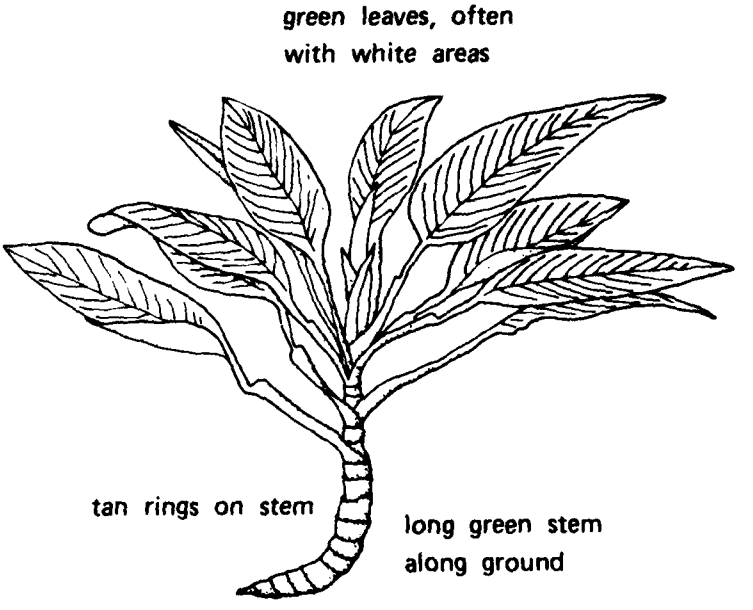

Figure 59. *Dieffenbachia* species.

Scleria macrophylla — Swamp sedge — Cypercaceae

Leaves: Leaf blades (15 to 16 cm long and 1 to 7 cm wide) have rough margins.

Shape: This stout herb grows 1 to 3 meters tall. There are phlanges or wings, particularly where the leaf blade wraps around the stem. The wings have smooth margins; stems have squared edges.

Fruits: This herb fruits at the beginning of dry season. Seeds are large (3.5 to 6 mm), white, and shiny, with a conical bump at the tip.

Abundance and Habitat: This sedge is found on marshes and along lake shores, often submerged or forming dense mats on the water surface. There are many sedges of this genus to be found in the forest, marshes, and drier areas.

Similar Species: A notorious relative of the swamp sedge is saw grass or cut grass, Scleria secans. It is a climbing or vinelike sedge, 3 to 6 meters tall. The leaves are 30 centimeters long and 2 to 7 millimeters wide. On the leaf blade, along the margins, midribs, and the phlanges where the leaf wraps around the stem, are wickedly sharp, minute, saw-like projections.

C. Grasses and Hedges

Andropogon bicornis — Rabo de chivo — Rabo de venado — Gramineae

Leaves: Leaf blades are long (60 cm), slender (2-4 cm), and curving, often with a white stripe down the midvein. The leaves are rough to the touch, with tiny saw-like projections on the margins, midvein, and upper surface.

Shape: This is a tall (1 to 2.5 m), erect, cane grass, which grows in large stands.

Flowers: In the rainy season, the grass produces a tall, dense, feathery, white plume. Fields of these white plumes dominate the landscape along the canal from August to October.

Abundance and Habitat: This grass is encountered in marshes, savannahs, fields, and open hillsides.

Similar Species: Andropogon bicornis may be confused with Schizachyrum microstachyum, another tall grass (1 to 1.5 m); however, the blades of this grass are smooth--not rough to the touch. Also, the plume branches which hold the seed are zig-zag, not straight like Andropogon bicornis. Andropogon virginicus, an introduced relative, is smaller with a brown feathery plume.

Panicum grande — Corn grass — Gramineae

Leaves: This grass is distinctive for its very broad leaves. The blades are about 1 meter long and 6 centimeters wide, and have rough margins.

Shape: Total plant height can be 1.5 to 2 meters, but the lower quarter of the plant may be submerged in water.

Flowers: The flowers are quite unlike corn; the name refers only to the leaves. The grass develops a terminal flower stalk (30 to 60 cm). The flower plume has long branches (40 cm), diffusely spread and naked at the base.

Abundance and Habitat: This grass grows in dense stands in marshes and along the waters edge.

Arundinella deppeana — Foxtail — Gramineae

Leaves: Leaf blades are slender (1 to 2 cm) with tiny, saw-like projections on the margins.

Shape: Arundinella is a tall (1 to 2.5 m), erect, cane-like grass. The leaf blades are widely dispersed on the stem and of varying lengths.

Flowers: The distinctive, terminal, spike-like flower (25 to 70 cm long) is golden or brownish in color. Leaves grow close to the flower.

Abundance and Habitat: Arundinella grows in small stands and is common in savannahs and along banks.

Bambusa vulgaris — Domestic bamboo — Gramineae

This cultivated bamboo escapes to the forest, or remains after cultivation while the forest grows around it. This tall (30 m) grass has stems with a diameter of up to 12 centimeters. The stems are green when young and turn yellow with age.

Chusquea simpliciflora
Rhipidocladum racemiflorum — Climbing bamboo — Gramineae

There are two species of this arching or clambering vinelike grass. Each has pencil-thin (5-8 mm) stems and numerous short, leafy branches.

In Chusquea, the leaf blades are small (5 to 9 cm long and 8 to 15 cm wide), and the upper surface of the leaf is rough to the touch. The blade is wider at the base than at the tip, and the midvein is prominent. Grass stems grow in small clumps, reaching lengths of 25 meters. This vine-like grass, or climbing bamboo, can smother vegetation.

In Rhipidocladum, The leaf blade is longer than Chusquea (up to 12 cm long and 4 to 12 cm wide), and the lower surface of the blade is hairy while the upper surface is smooth. There is no prominent midrib in this species. After a stand blooms (at intervals of several years), it dies. Later, many seedlings can be found under the dead, brittle stems. Grass stems grow in dense clumps, reaching lengths of 5 meters.

Both Chusquea simpliciflora and Rhipidocladum racemiflorum are common in moist thickets or forests.

Panicum maxima — Guinea grass — Gramineae

Leaves: Leaf blades (70 cm long and 3 cm wide) are smooth to the touch, without any roughness or saw-like projections.

Shape: This tall (1 to 2.5 m), erect grass has stout stems growing in large clumps or stands. The leaf blades are very stiff and upright.

Flowers: The tall flowering stem supports very diffuse plumes, with long flowering branches spreading in whorls. Flower branches are naked towards the main stem.

Abundance and Habitat: This grass, introduced from Africa, is one of the most abundant roadside and pasture grasses in Panama. It is common in dry areas.

APPENDIX A. GLOSSARY OF TECHNICAL TERMS

ALTERNATE LEAVES - leaves which come off the twig singly, staggered one on one side of the twig and the next on the other side.

BUTTRESS - the base of the trunk which is folded and splays out, acting as a support for the tree.

COMPOUND LEAVES - leaves made up of more than one leaflet (leaf blade); they may be either palmately or pinnately compound (see figures 2 and 3).

CROWN - the area at the top of the tree where the leaves are located (see figure 4).

LADDER VENATION - the arrangement of leaf veins which looks like a ladder i.e. 3-5 major veins which run parallel to each other from the leaf base to the tip with secondary veins perpendicular to these (see figure 5).

LEAF - the blade and leaf stalk which are attached to the twig as a unit; leaves can be simple (one blade, see figure 5) or compound (many leaflets, see figures 2 and 3).

LEAFLET - one of several leaf-like blades which are attached to a main leaf stalk and which together form one compound leaf (see figures 2 and 3).

LEAF STALK - the stalk which attaches the leaf blade to the twig (see figures 2, 3, and 5).

LEAFLET STALK - the stalk which attaches each leaflet to the main leaf stalk (see figures 2 and 3).

LOBES - the rounded projections and indentations of a leaf blade which make it look scalloped; these can be either at the leaf base, like the lobes of an ear, or along the leaf margin.

MIDRIB - the large, central vein of a leaf (or leaflet) which continues from the stalk to the blade tip (see figure 5)

OPPOSITE LEAVES - leaves which come off the twig in pairs, one on each side of the twig so that the leaf stalks are opposite each other.

PALMATELY COMPOUND LEAVES - compound leaves whose leaflet stalks radiate from a central point like spokes of a wheel or like fingers from the palm of a hand (see figure 3).

PINNATELY COMPOUND LEAVES - compound leaves whose leaflets are arranged in rows along a central leaf stalk like a feather (see figure 2).

RELAY BRANCHING - a scalloped, branching pattern seen in the smaller branches of some trees (see figure 4).

SECONDARY VEINS - the smaller veins which branch off from the center vein or midrib (see figure 5).

SIMPLE LEAVES - leaves which are not compound, but have one leaf blade attached by a stalk directly to the twig (see figure 5).

STAMENS - thin, pollen-tipped filaments or bristles at the center of flowers.

STIPULE - a small leaf-like structure which attaches to the twig at the base of the leaf stalk; it can look like a flag (see figure 5) or be folded like a sheath around a young leaf at the branch tip.

TERTIARY VEINS - the small veins which branch off from secondary veins (see figure 5).

WHORL - an arrangement in which several leaves or branches come off the stem at one place, forming a tight spiral.

APPENDIX B. INDEX

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